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Mitchell

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(54) **HOOK WITH MAGNETIC CLOSURE**

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F16B 45/04 (2006.01)
A44C 5/20 (2006.01)

(52) **U.S. Cl.**

CPC **F16B 45/04** (2013.01); **A44C 5/2038** (2013.01); **F16B 45/02** (2013.01); **A44D 2203/00** (2013.01); **Y10T 24/32** (2015.01); **Y10T 24/4533** (2015.01); **Y10T 24/4544** (2015.01); **Y10T 24/45435** (2015.01); **Y10T 24/4755** (2015.01)

(58) **Field of Classification Search**

CPC F16B 45/02; F16B 45/04; H01F 7/0263; A44C 5/2038; A44D 2203/00
USPC 24/265 H, 303, 601.5, 599.3, 601.6
See application file for complete search history.

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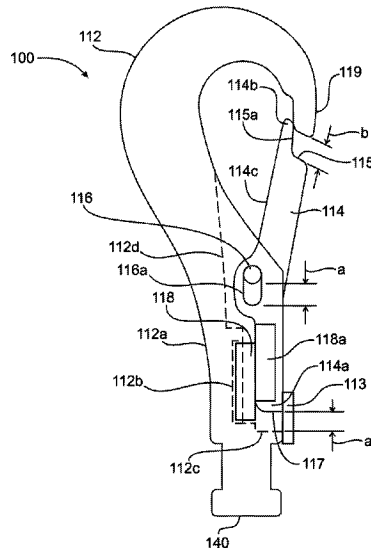
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(57) **ABSTRACT**

A hook shaped body having a neck and fabricated from non-ferromagnetic material. The body possesses a first end and a second end. The neck is proximate the first end. The hook also includes a closure that is fabricated from ferromagnetic material and has a first closure end and a second closure end. The closure is pivotally attached to the body and is positioned to span a gap between the second end of the hook and the body. There is at least one magnet fixedly attached to the neck, so that at least one magnet holds the closure in a closed position that spans the gap such that the hook encloses a defined space in the closed position.

24 Claims, 13 Drawing Sheets



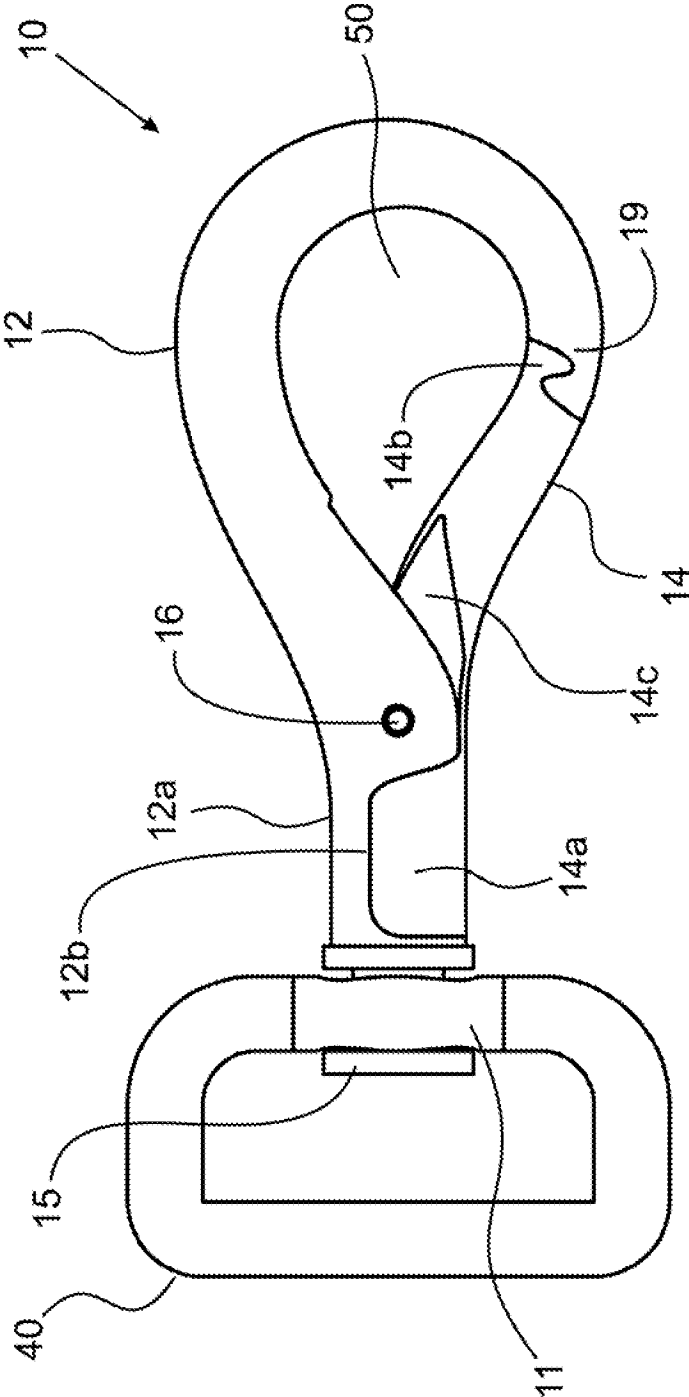


Fig. 1

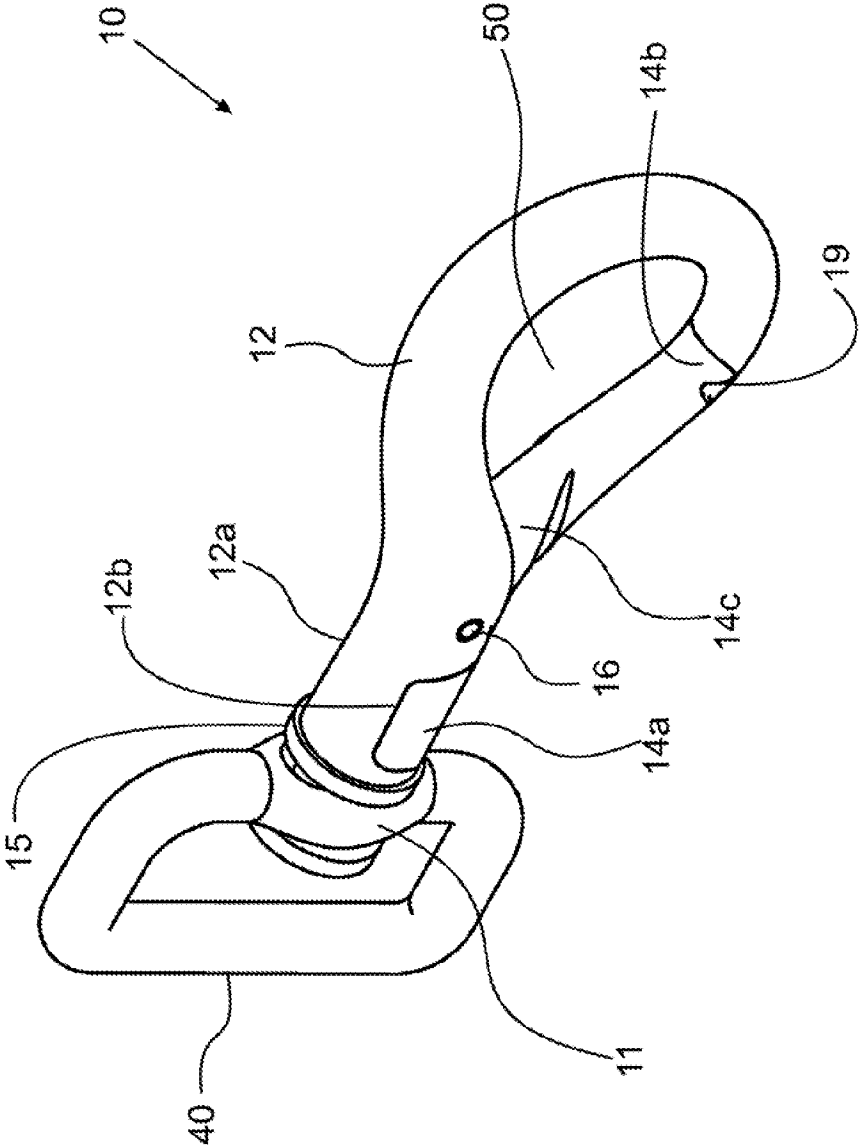


Fig. 2

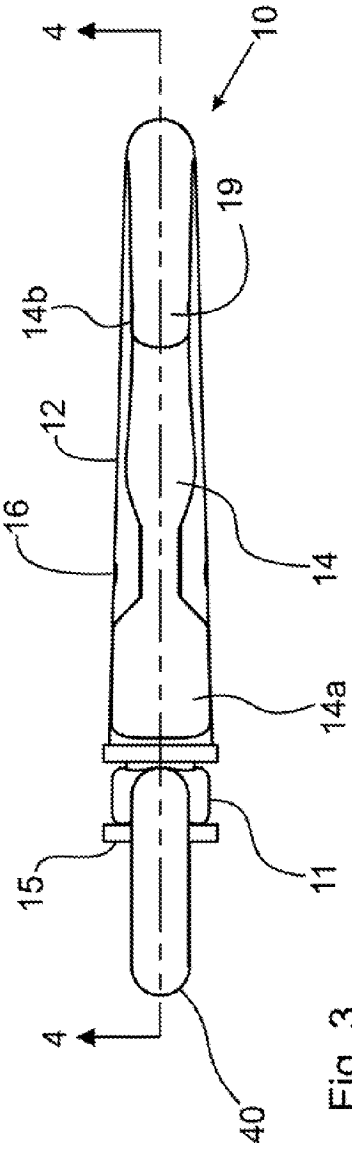


Fig. 3

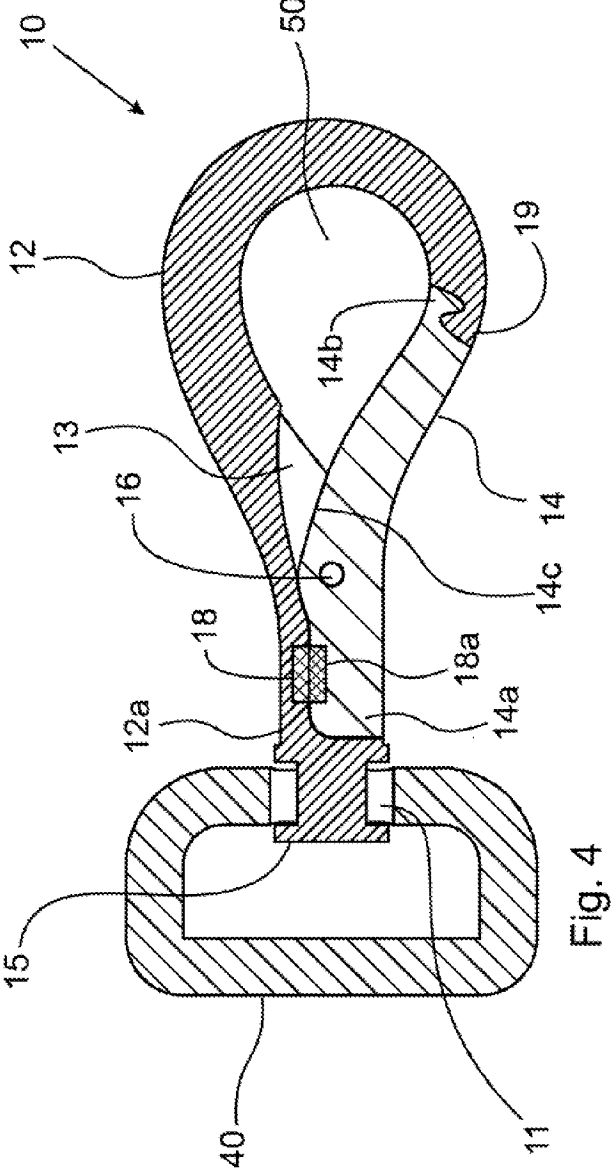
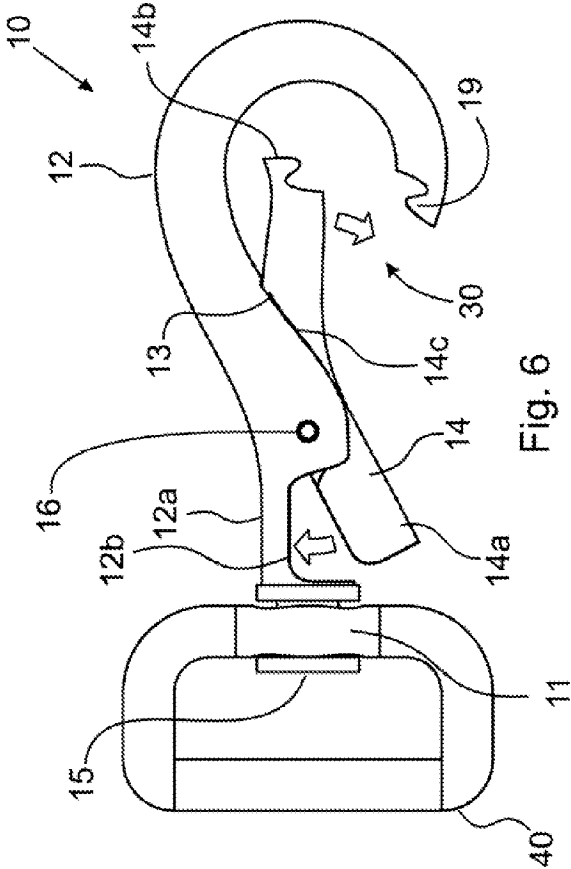
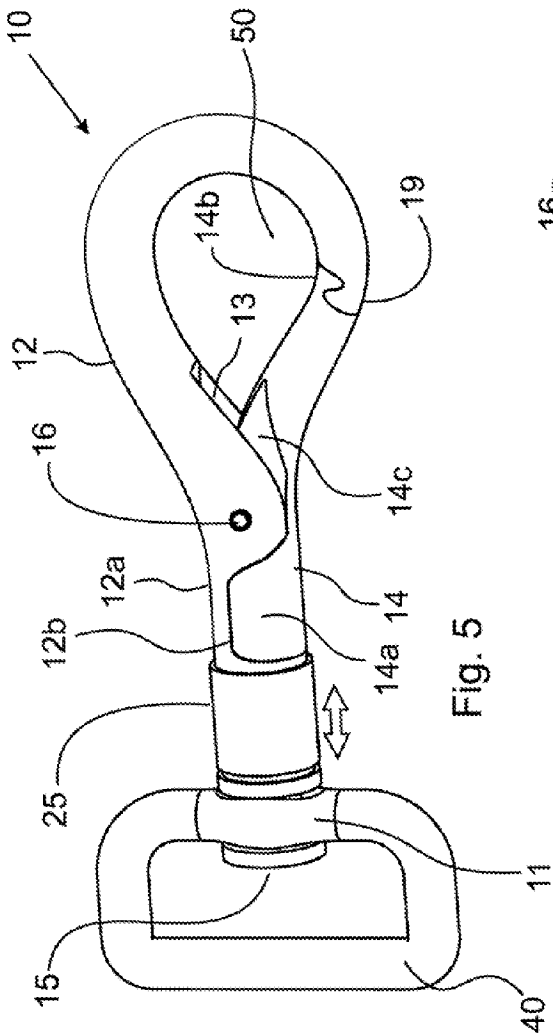


Fig. 4



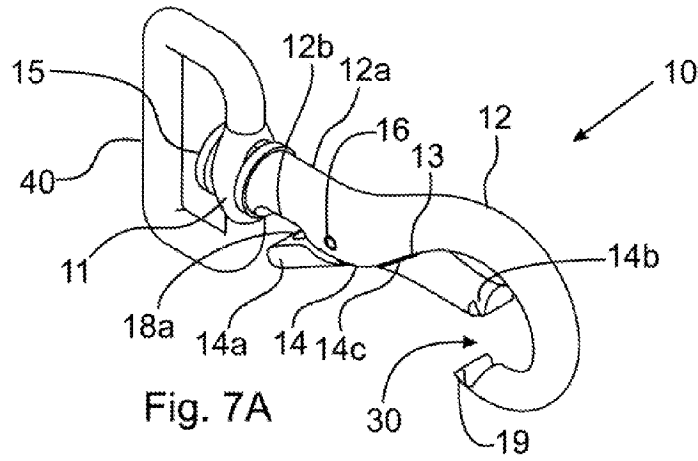


Fig. 7A

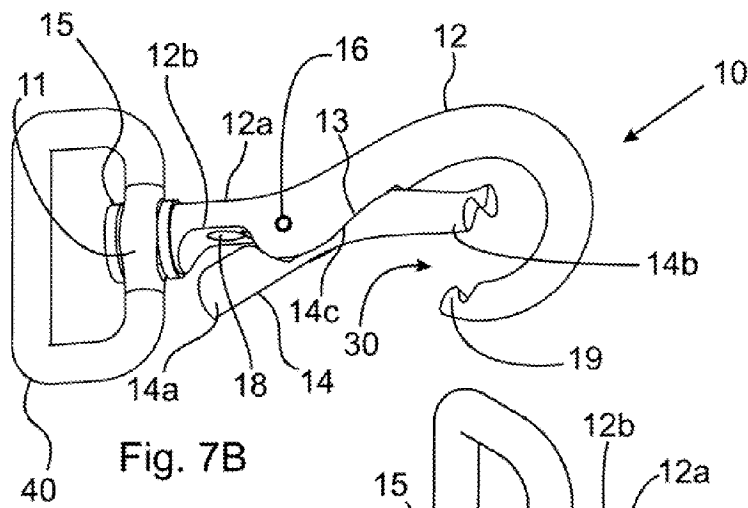


Fig. 7B

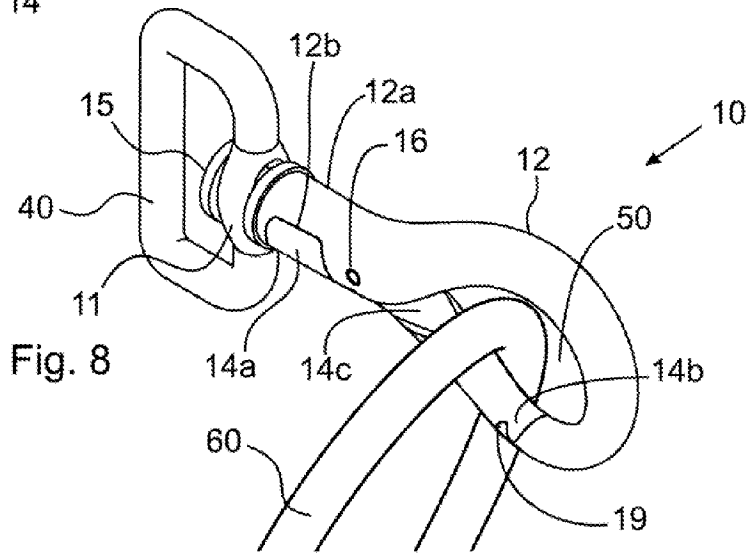


Fig. 8

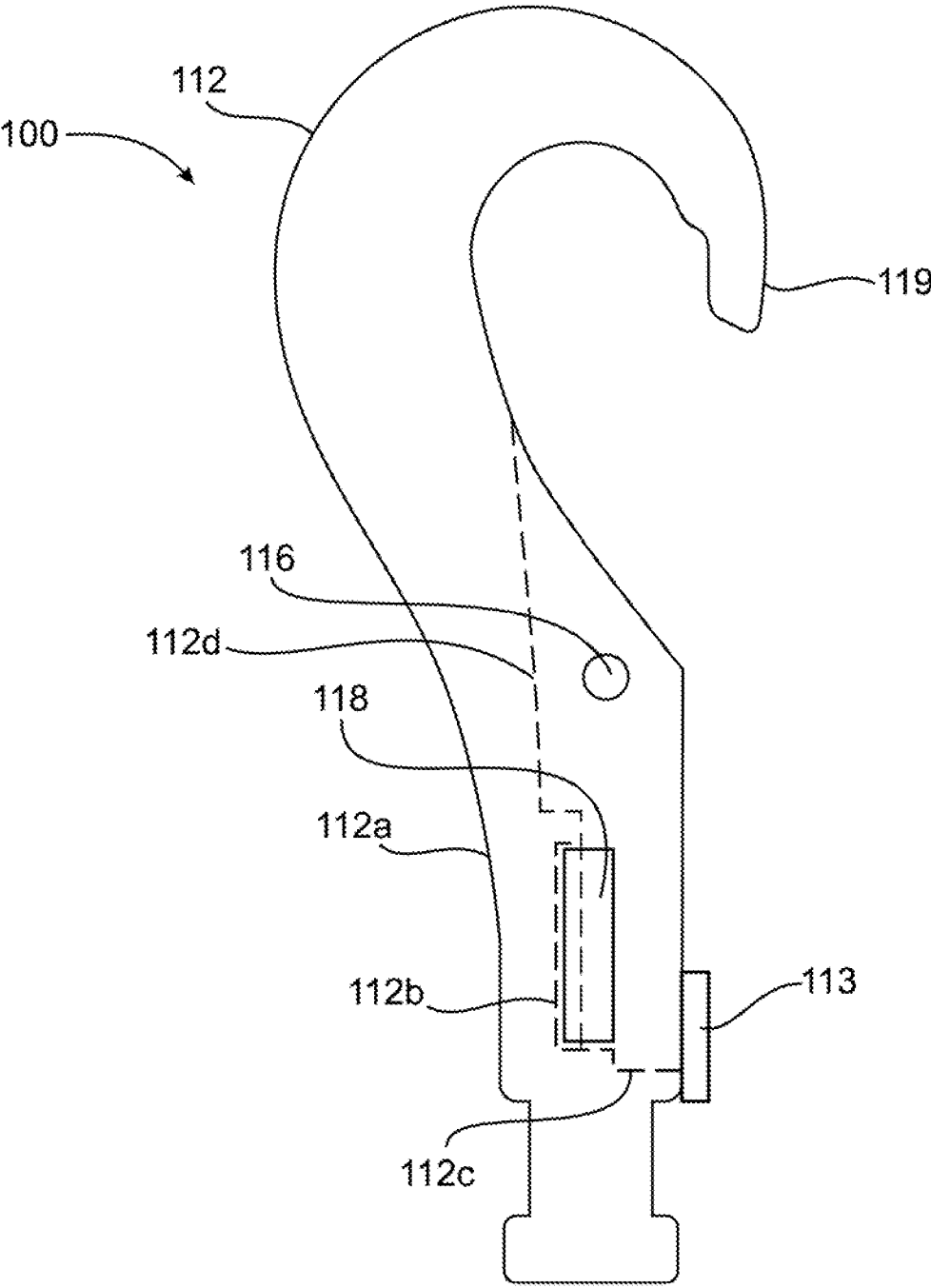


Fig. 9

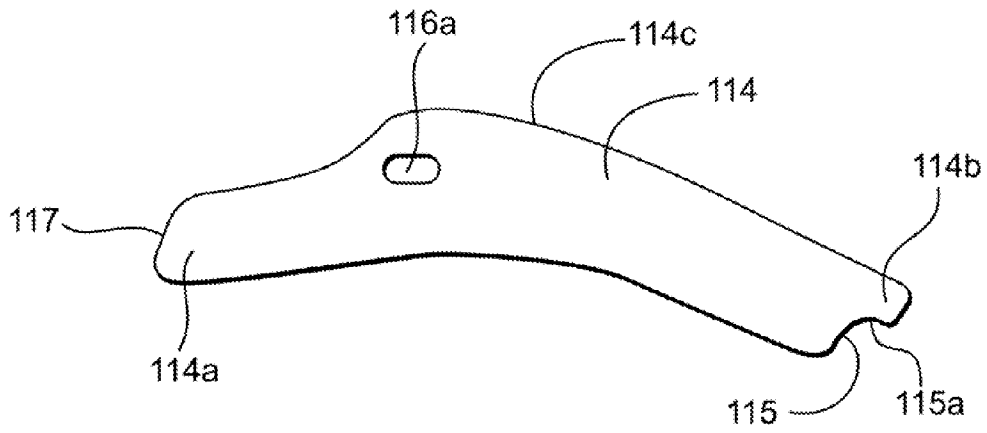


Fig. 10A

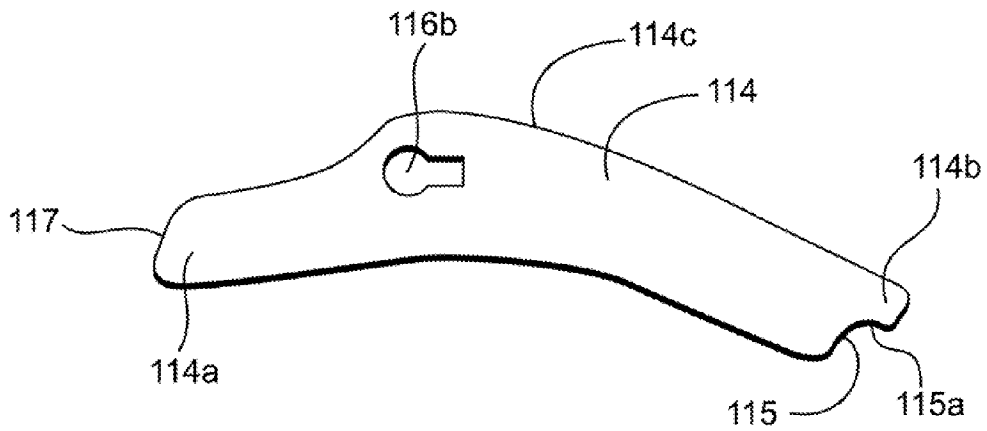


Fig. 10B

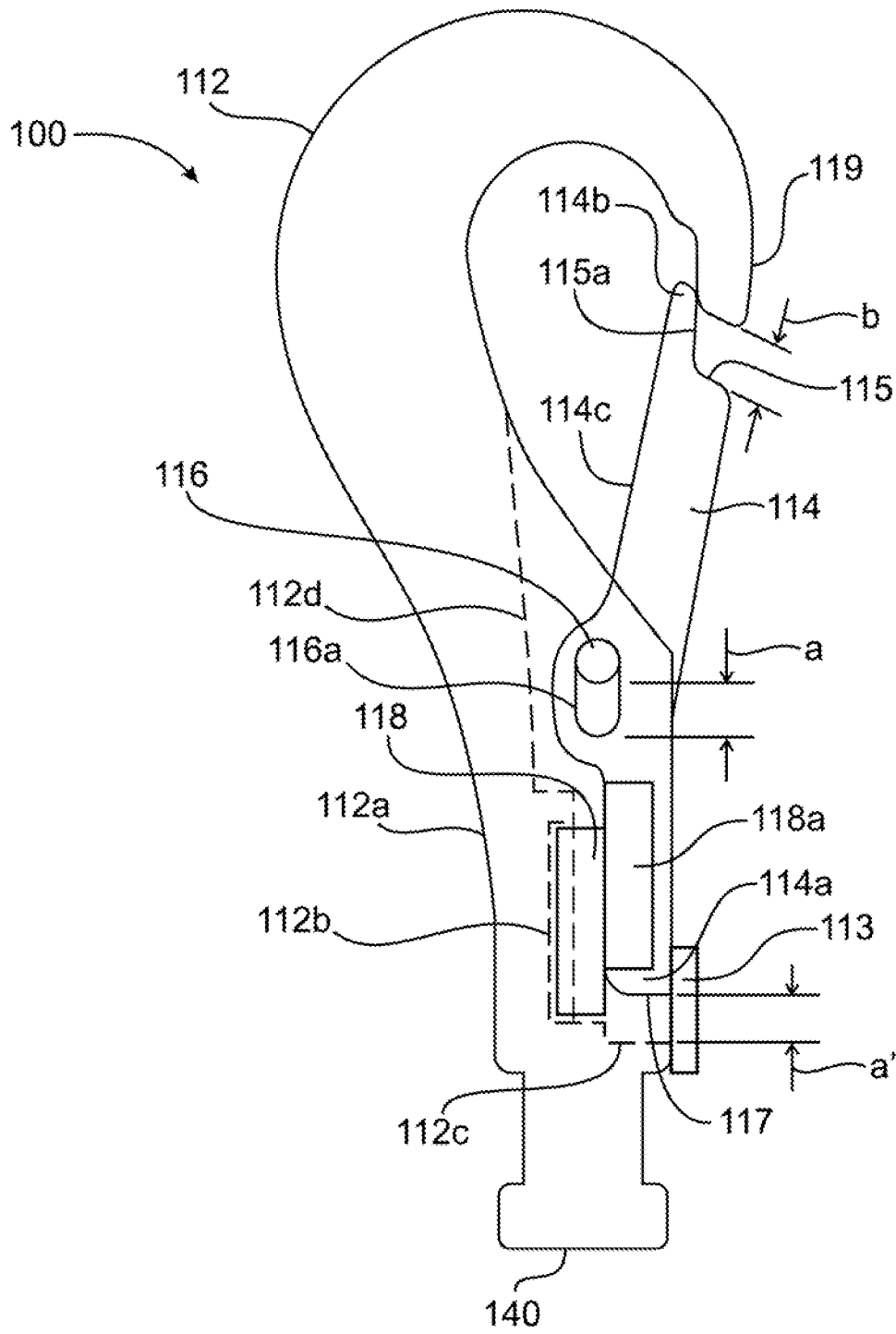


Fig. 11

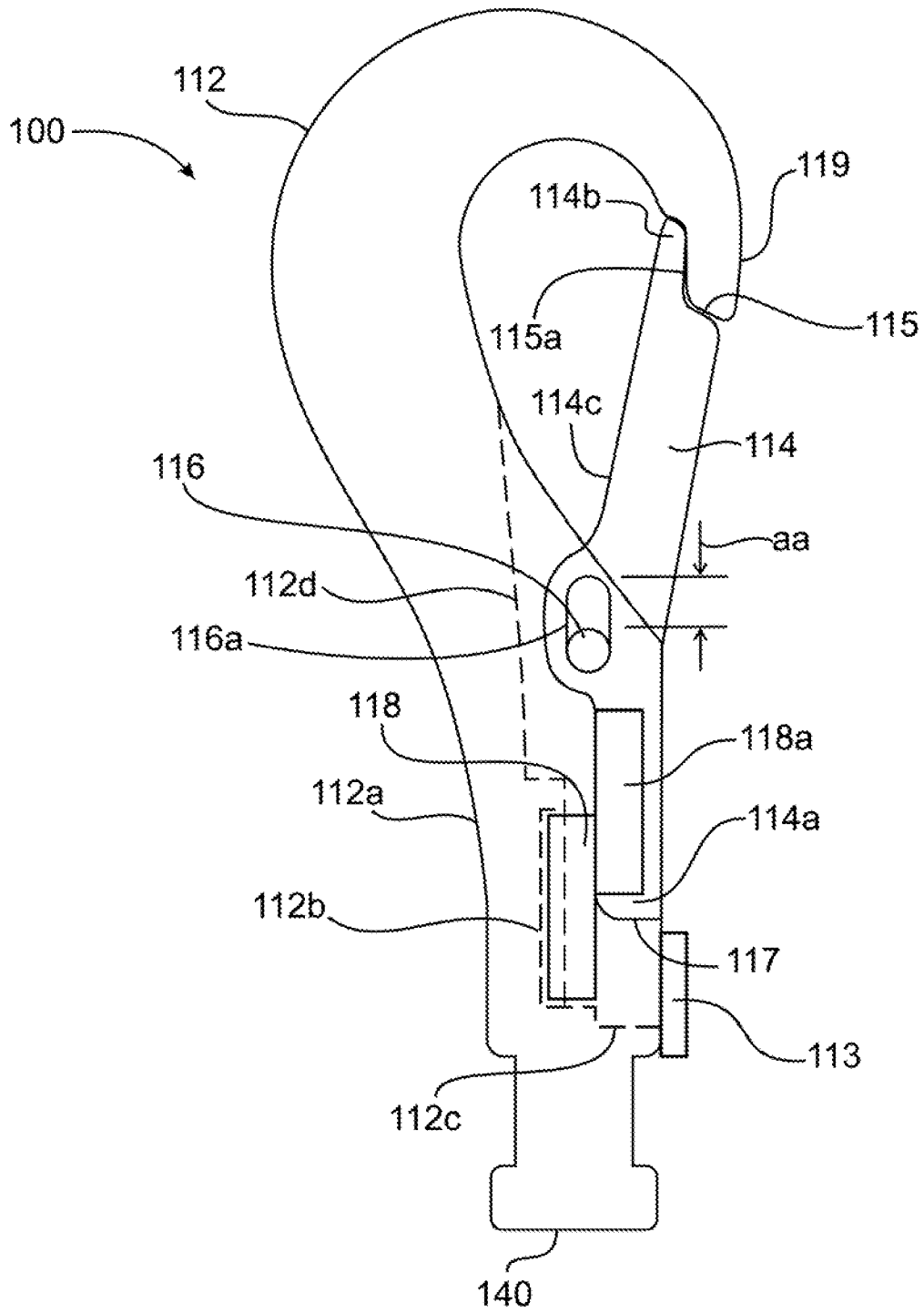


Fig. 12

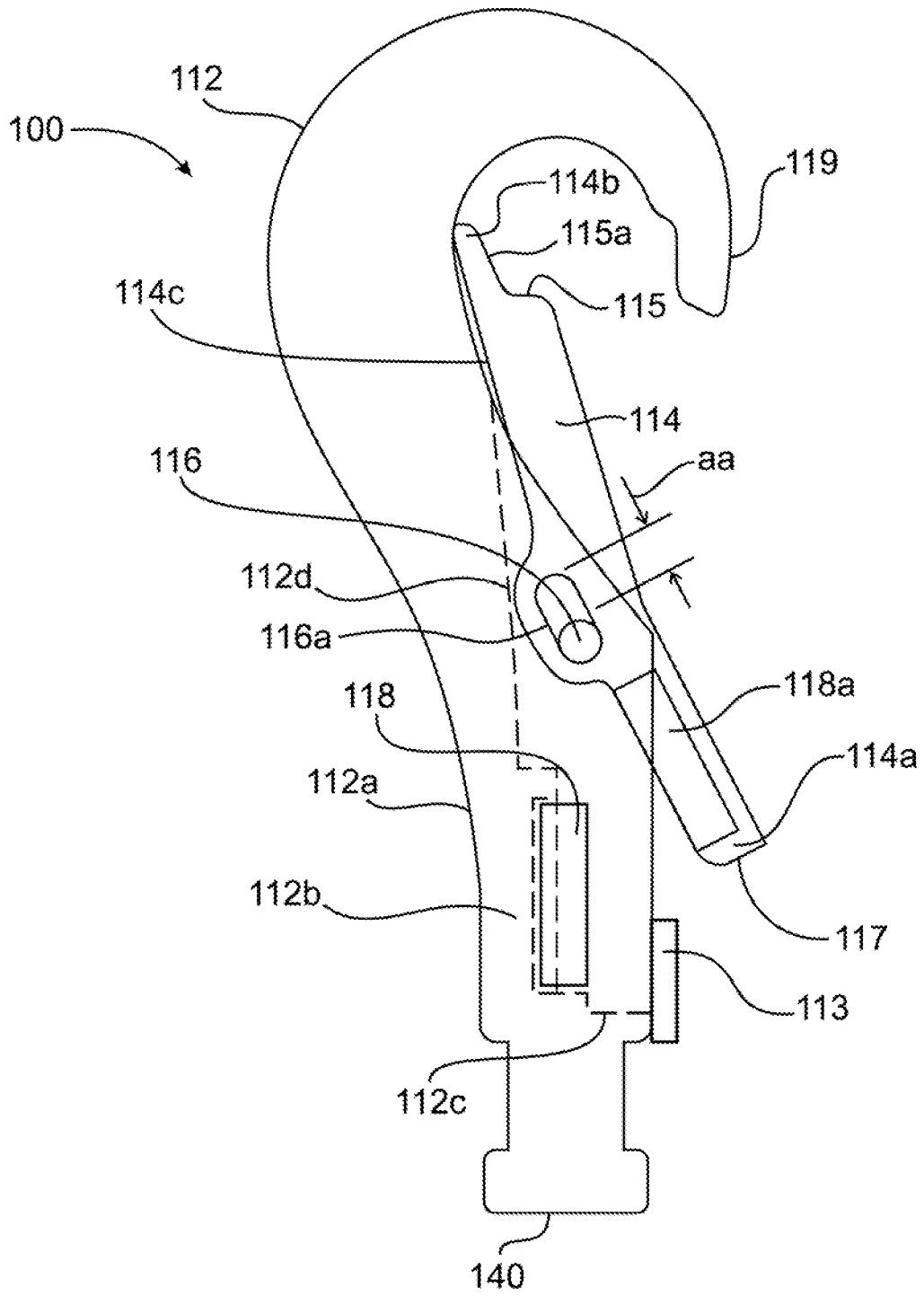


Fig. 13

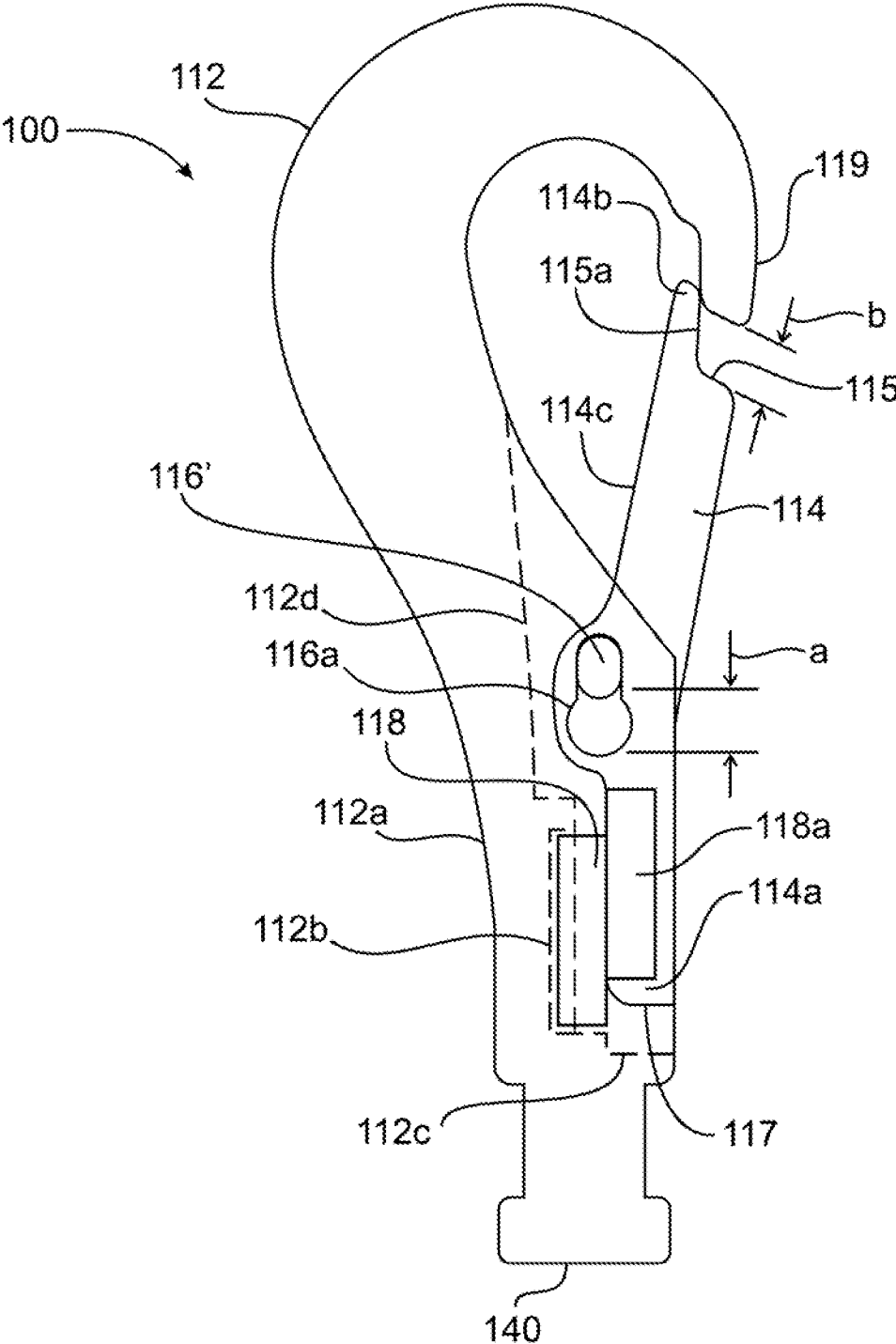


Fig. 14

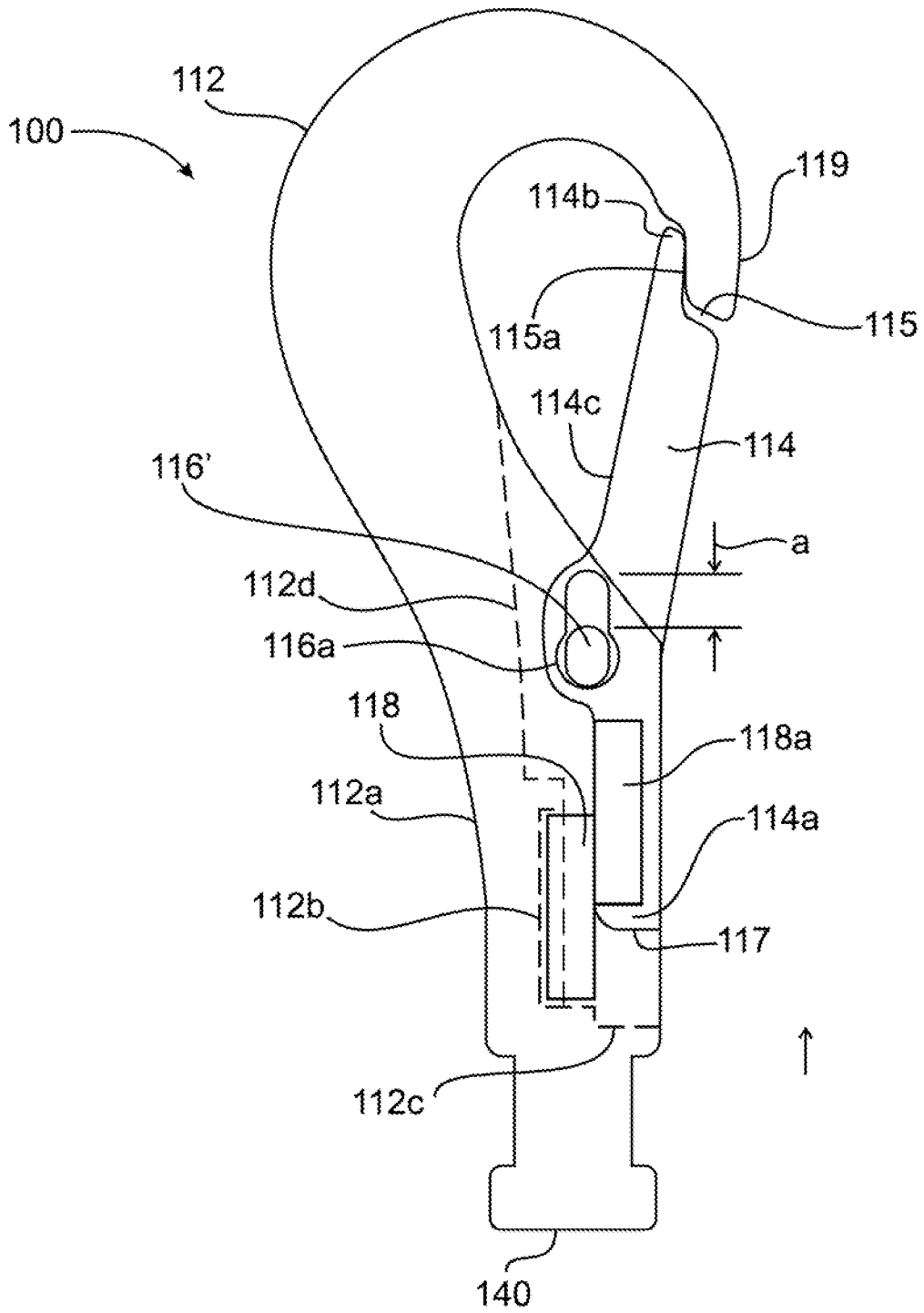


Fig. 15

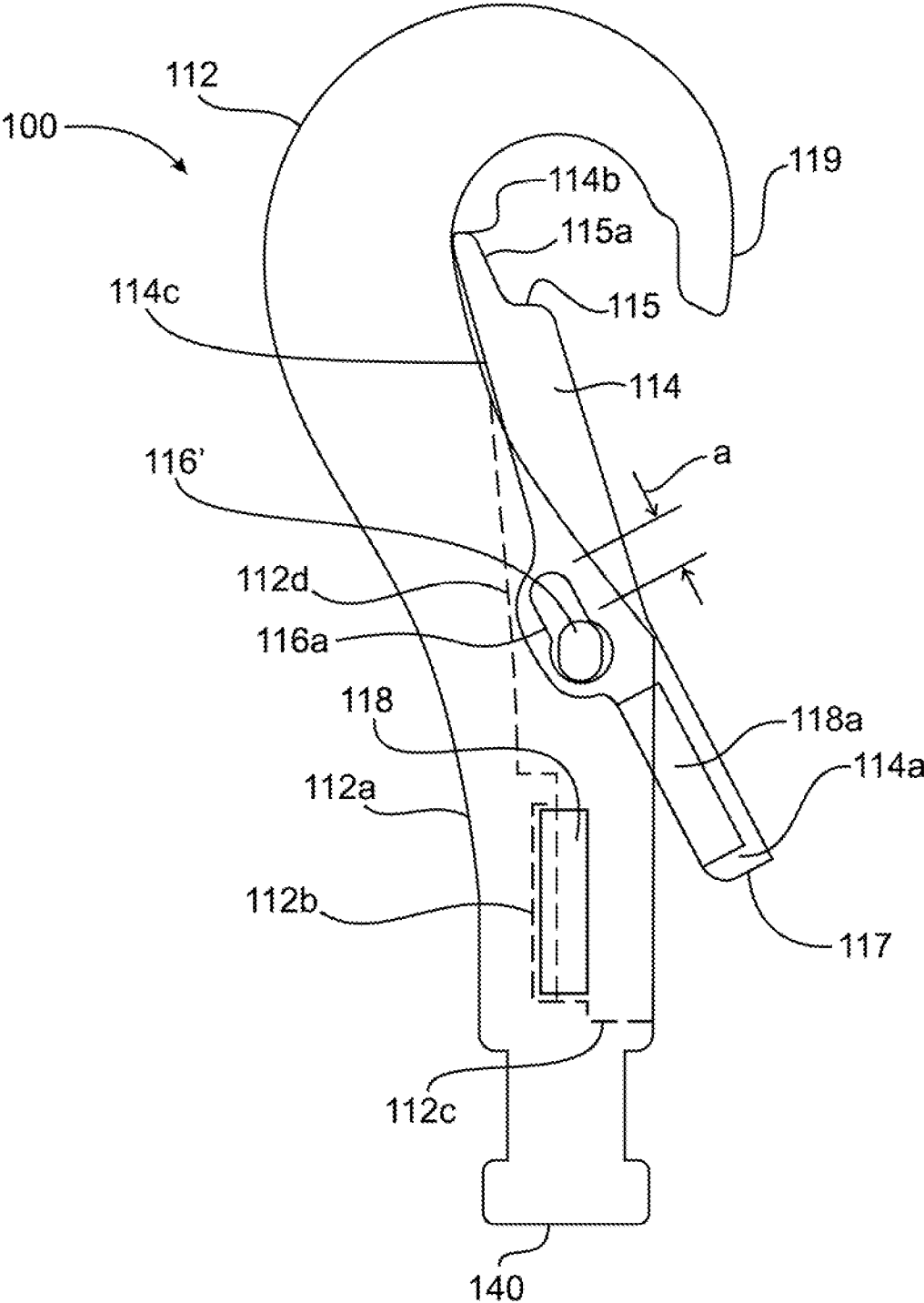


Fig. 16

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HOOK WITH MAGNETIC CLOSURE**CROSS REFERENCE TO RELATED APPLICATIONS**

This application is filed under 35 U.S.C. §120 as a continuation-in-part patent application of U.S. patent application Ser. No. 12/881,744, filed Sep. 14, 2010, now U.S. Pat. No. 8,448,307, which application is incorporated herein by reference in its entirety.

FIELD OF THE INVENTION

The present invention relates generally to the field of hooks and clasps, specifically to hooks and clasps with a closing mechanism, and more specifically to closures that are manually operated.

BACKGROUND OF THE INVENTION

Manually operated hooks or clasps are found in the prior art that operate using a spring that holds the hook closure closed when the spring is extended. When springs are extended they exert little or no force, meaning that the hook closure is held closed with little or no force. This makes it relatively easy to slightly open the closure to enable the hooked item to slip off the hook. When the closure is opened more completely, the spring exerts progressively more force making the closure harder to open as the spring is compressed. Thus, in prior art hooks of this type, it is harder to purposely open the hook to attach or secure something than it is to accidentally lose something off the hook.

The prior art design tends to cause injuries in that the compressed spring can snap forward unexpectedly injuring the user. In addition, the protruding knob used to pull and hold open the spring is often uncomfortable or even painful to operate.

U.S. Pat. No. 7,441,424 to Saitoh, et al. discloses a clamp that opens similar to a scissors with two arms connected by an off-center pivot pin. The two opposing long arms include a pin to hold a security tag or materials while each of the two short arms includes a magnet of opposing polarity which together hold the clamp in the closed position. The clamp has the disadvantage of not securing an item on the arm and not enabling secure movement of the secured item when the disclosed clamp is closed.

U.S. Patent Application Publication No. 2007/0209168 to Dietz teaches a magnetic spring clip that is attached to an instrument such as a pen or penlight. However, the clip requires that a magnet be in the instrument that is held by the clip thereby introducing a limitation to its usefulness in that nonmagnetic devices cannot be securely held by the clip.

U.S. Patent Application Publication No. 2008/0250615 to Emenheiser teaches a retainer apparatus in the form of a modified hook having a closure that is held in the open position by a magnet. The retainer includes a biasing device to move the closure into the closed position. The Emenheiser retainer requires a trigger to activate the biasing device which, similar to other prior art discussed above, has reduced force to keep the retainer in the closed position. In addition, the use of a trigger mechanism increases the possibility of injury caused by the inadvertent activation of the biasing trigger.

In addition, as mentioned above, the clasps and hooks currently in the field are easily opened accidentally because of the lack of positive force holding the closure in the closed position. The main impediment to overcoming this deficiency is devising a simple structure that not only provides positive

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closing force to the closure, but can still be easily opened without excessive force and require a minimum number of parts.

Thus, it can be seen there is a need in the field for a hook closure that is easily opened, utilizes a positive force to hold a clasp or hook in the closed position around a hook type of device, and prevents or reduces accidental opening of the clasp or hook.

SUMMARY OF THE INVENTION

The present invention broadly comprises a hook comprising: a body having a neck and formed into a hook shape and fabricated from nonferromagnetic material with the body having a first end and a second end. The neck is proximate the first end. The hook also comprises a closure having a first closure end and a second closure end that is fabricated from nonmagnetic ferromagnetic material, the closure being centrally pivotally attached to the body and positioned to span a space between the second end of the hook and the body. There is at least one magnet fixedly attached to the neck, wherein the at least one magnet holds the closure in a closed position that spans the gap such that the hook encloses a defined space in the closed position.

In an alternate embodiment, the present invention broadly comprises a body having a neck and formed into a hook shape and fabricated from nonferromagnetic material, the body having a first end and a second end wherein the neck is proximate to the first end; a pin centrally attached to the body; a closure having a first closure end and a second closure end and fabricated from nonmagnetic ferromagnetic material, the closure having a slot and pivotally and slidably attached to the pin and positioned to span a space between the second end and the body in a closed position: a neck groove formed in the neck to receive the first closure end and including a groove wall proximate the first body end; a lip extending from the body and facing the neck groove, the lip maintaining the closure in the closed position; at least one neck magnet fixedly attached to the neck groove; and, at least one closure magnet fixedly attached to the closure proximate the first closure end. The at least one neck magnet and the at least one closure magnet are offset from each other and possess opposite polarity and hold the closure in the closed position. The hook encloses a defined area in the closed position.

One object of the invention is to provide a hook that uses magnetic force to keep the closure in a closed position.

A second object of the invention is to replace a biasing spring to hold a closure in place with a magnetically closed closure.

A third object of the invention is to provide a hook that is safe to use and easy to open.

Another object is to demonstrate a hook that is safer to use than the prior art.

An additional object of the invention is to provide a hook in which the closing force is becomes stronger as the closure approaches the closed position.

A further object is to supply a locking mechanism for the hook.

A still further object of the invention is to offer a hook devised to decrease or prevent accidental openings while simultaneously configured to open easily.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

The nature and mode of the operation of the present invention will now be more fully described in the following

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detailed description of the invention taken with the accompanying drawing Figures, in which:

FIG. 1 is a side view of the hook of the present invention;

FIG. 2 is a side perspective view of the hook of the present invention;

FIG. 3 is a bottom view of the hook showing the closure in the closed position;

FIG. 4 is a cross section of the hook taken along line 4-4 of FIG. 3;

FIG. 5 is a bottom perspective of the present invention depicting the receiving groove formed into the body of the hook;

FIG. 6 is a side view of the hook demonstrating the closure in the open position forming a space between the second end of the hook and the body of the hook;

FIG. 7A is a top perspective view of the hook in the open position;

FIG. 7B is a side perspective view of the hook in the open position;

FIG. 8 is a top perspective view of the hook of the present invention securing a loop with the closure in the closed position;

FIG. 9 is a side view of a second embodiment of the hook of the present invention without a closure and including a lip opposite the neck groove;

FIG. 10A is a side view of one embodiment of the closure of the hook seen in FIG. 9 in which the pivot slot is oval-shaped;

FIG. 10B is a side view of an alternate embodiment of the closure in which the slot is keyhole shaped;

FIG. 11 is a side view of the second embodiment of the hook depicting the closure in the closed position i.e., spanning the space between second closure end and the hook body;

FIG. 12 is a side view of the second embodiment of the hook in which the closure is pushed forward off the lip;

FIG. 13 is a side view of the book showing the closure in the open position;

FIG. 14 is a side view of the second embodiment of the hook similar to FIG. 9 showing alternate embodiments of the closure slot and the pivot;

FIG. 15 is a side view of the hook seen in FIG. 14 showing the closure pushed toward the second hook end; and,

FIG. 16 depicts the hook with the closure having the key-hole slot in the open position.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

At the outset, it should be appreciated that like drawing numbers on different drawing views identify identical structural elements of the invention. It also should be appreciated that figure proportions and angles are not always to scale in order to clearly portray the attributes of the present invention.

While the present invention is described with respect to what is presently considered to be the preferred embodiments, it is understood that the invention is not limited to the disclosed embodiments. The present invention is intended to cover various modifications and equivalent arrangements included within the spirit and scope of the appended claims.

Furthermore, it is understood that this invention is not limited to the particular methodology, materials and modifications described and as such may, of course, vary. It is also understood that the terminology used herein is for the purpose of describing particular aspects only, and is not intended to limit the scope of the present invention, which is limited only by the appended claims.

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Unless defined otherwise, all technical and scientific terms used herein have the same meaning as commonly understood to one of ordinary skill in the art to which this invention belongs. It should be appreciated that the term "substantially" is synonymous with terms such as "nearly", "very nearly", "about", "approximately", "around", "bordering on", "close to", "essentially", "in the neighborhood of", "in the vicinity of", etc., and such terms may be used interchangeably as appearing in the specification and claims. Although any methods, devices or materials similar or equivalent to those described herein can be used in the practice or testing of the invention, the preferred methods, devices, and materials are now described. It should be appreciated that the term "proximate" is synonymous with terms such as "nearly", "close", "adjacent", "neighboring", "immediate", "adjoining", etc., and such terms may be used interchangeably as appearing in the specification and claims.

Adverting to the drawings, FIG. 1 is a side view of hook 10. Hook 10 is attached to ring 40 by attachment 11. Attachment 11 is shown as a swivel attachment that allows hook 10 to move through an arc. Persons of ordinary skill in the art will recognize that other types of attachments 11 are suitable to hold ring 40 to hook 10. Examples of such attachments include, but are not limited to, pivot attachments as with ball and socket attachments and solid attachments. Examples of ring 40 include, but are not limited to, o-rings, d-rings, chain attachments, handles, etc.

First end 15 of hook 10 is attached to attachment 11. Neck 12a extends from first end 15 and is preferably integral with body 12. By integral is meant that the component parts are formed together as a single unit. Preferably, hook 12 is fabricated from nonferromagnetic material. By ferromagnetic is meant material that it is attracted to magnets. Therefore, the term "nonferromagnetic" describes material that is not attracted to magnets. Body 12 is shaped into a hook having second end 19 at the end of the hook. Body 12 is shown as having a curved shape. It will be recognized that body 12 may have a straight body shape between neck 12a and the curved portion of the hook forming a j-shaped hook.

Closure 14 is pivotally attached to body 12 using pivot 16 and is preferably fabricated from nonmagnetic ferromagnetic material. Pivotal attachment 16 enables closure 14 to open and close by rotating on pivot 16. Pivot attachment 16 is substantially in the center of closure 14. When closure 14 is in the closed position, it spans the space between second end 19 and body 12 of hook 10. In a preferred embodiment, second closure end 14b and second end 19 are each configured to form a mating type fit an example of which is seen in FIG. 1.

In a preferred embodiment shown in FIG. 1, body 12 and neck 12a are formed to receive closure 14 in both the open and closed positions, respectively. Neck 12 is formed to include neck groove 12b which receives first closure end 14a when closure 14 is moved to the closed position extending to second end 19 of hook 10 to decrease the size of neck 12a. In the open position, receiving groove 13 in body 12 (not seen in FIG. 1) receives closure 14 when it is rotated away from second end 19 through space 50 to body 12. Preferably, closure 14 includes region 14c which contacts receiving groove 13 when closure 14 is opened. Preferably, region 14c is formed, for example flattened, to matingly fit into receiving groove 13 to increase the size of space 50 when closure 14 is opened. The size will be increased as a reduced volume of closure 14 will extend into space 50 in the open position. FIG. 2 is a side perspective view of hook 10 showing more clearly region 14c.

FIG. 3 is a bottom view of hook 10 showing closure 14 in the closed position. FIG. 4 is a cross section taken along line

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4-4 of FIG. 3. Neck magnet **18** is seen fixedly attached to neck **12a**, preferably so as to have a surface exposed in neck groove **12b**. While the manner of fixed attachment shown in FIG. 4 is embedding, it will be recognized that other forms of fixed attachment may be used, such as, but not limited to, adhesives and press fit or friction fit into a recess. FIG. 4 also depicts an alternate embodiment in which closure magnet **18a** is embedded so as to be exposed on the surface of first closure end **14a** opposite neck magnet **18**. In this embodiment, magnet **18a** will be of the opposite polarity of magnet **18** thereby providing increased attractive magnetic force holding closure **14** in the closed position. Preferably, the strength of neck magnet **18** and/or closure magnet **18a** are such as to enable a user to open closure **14** using one or two fingers. It will be recognized that one or more magnets may be positioned in either neck groove **12b** or at first closure end **12a**. In alternate embodiments, a single magnet **18** may be used without magnet **18a** or magnet **18a** may be used without magnet **18**. Also seen is receiving groove **13** in body **12**.

FIG. 5 is a bottom perspective view of hook **10** in the closed position showing receiving groove **13** formed into body **12**. Also seen is an alternate embodiment in which collar **25** is placed on hook **10** so as to enable it to slide over neck **12a** and first closure end **14a**. By sliding over and enclosing neck **12a** and first closure end **14a**, closure **14** is locked by preventing it from rotating around pivot **16** to the open position. The double arrow shows the axial sliding direction of collar **25** on neck **12a**. In one embodiment, collar **25** is fabricated from ferromagnetic material which allows it to be held in the locking position by one or both of magnets **18** and **18a**.

FIG. 6 is a side view of hook **10** demonstrating closure **14** in the open position. In the open position, closure **14** is rotated away from second end **19** to form space **30** between second end **19** and body **12**. In the embodiment shown, region **14c** is seen fitting into receiving groove **13**. The arrows show the movement of each end of closure **14** from the open to the closed position. FIGS. 7A and 7B are top perspective and side perspective views, respectively, of hook **10** in the open position. FIG. 7A depicts the embodiment that includes magnet **18a** fixedly attached to first closure end **14a**. FIG. 7B shows magnet **18** in neck **12a** with its surface exposed at neck groove **12b**.

FIG. 8 is a top perspective view of hook **10** demonstrating the advantage of the magnetic closure **14**. Loop **60** is enclosed by closed hook **10** within area **50**. Although not seen in FIG. 8, persons of skill in the art will recognize that loop **60** is tied off to form a closed loop that prevents it from sliding out of area **50**. It can be seen that any force pulling loop **60** against closure **14** will actually apply additional rotational closing force against ferromagnetic closure **14** driving it toward neck groove **12a** and neck magnet **18**. It can also be seen that the arrangement of using force to hold closure **14** in the closed position provides an advantage over the prior art as it helps to prevent an item held by hook **10** ("hooked item") from slipping out of area **50** as opposed to a closure held in place by an axial spring as in the prior art which is easily opened.

Hook **10** is opened to receive a loop or other item by pushing closure **14** so as to rotate second closure end **14b** into enclosed area **50**. Magnet **18** can be sized to allow first closure end **14a** to be released easily by pushing with a finger. In contrast to spring-biased hook closures, the more closure **14** is pushed into area **50**, the easier it is to continue pushing because ferromagnetic first closure end **14a** is moved further from neck magnet **18**. The same principle applies if closure magnet **18a**, located in first closure end **14a**, is used with neck magnet **18** or alone. In addition, there is little snap or sudden closing of closure **14** as found in prior art hooks with biasing

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springs as the magnetic force only gradually increases as first closure end **14a** approaches magnet **18**. The distance for a sudden closing is limited to 2-3 mm.

FIG. 9 is a side view of hook **100** without a closure and including a lip opposite the neck groove of a second embodiment of the present invention. Hook **100** includes body **112**, neck **112a** proximate first body end **112e**, and second body end **119**. Also seen in shaded view is neck groove **112b** including groove wall **112c** and lip **113** opposing neck groove **112b**. As seen in FIG. 9, neck groove **112b** may extend into an inner surface of body **112** to form receiving groove **112d** for closure **114** (not seen in FIG. 9) in the open position. Alternatively, receiving groove **112d** may be a separate groove. A receiving magnet may optionally be located in receiving groove **112d**. Lip **113** may preferably be integral with body **112** or attached with screws, rivets, adhesives in methods known to those having skill in the art. By integral is meant that the component parts are formed together as a single unit. Pivot **116** extends through body **112**. In a one embodiment, pivot pin **116** ("pin **116**") is circular, meaning its cross section does forms a circle. In shaded view, neck magnet **118** is seen embedded in neck groove **112b**. In one embodiment, neck magnet **118** is approximately 10 mm long, 3 mm wide, and 2 mm deep, however, persons having skill in the art will recognize that the size of magnet **118** can be changed depending on the size of hook **100** and the magnetic force desired. Similar to hook **10** described above, a ring may be attached to hook **100** using a swivel attachment that allows hook **100** to move through an arc. Persons of ordinary skill in the art will recognize that other types of attachments are suitable to hold the ring to hook **100**. Example of such attachments include, but are not limited to, pivot attachments as with ball and socket attachments and solid attachments. Examples of rings include, but are not limited to, o-rings, d-rings, chain attachments, handles, etc.

FIG. 10A is a side view of one embodiment of closure **114**. First closure end **114a** and second closure end **114b** are on longitudinally opposite ends of closure **114**. Edge **117** is formed from first closure end **114a**. In one embodiment, offset **115** is formed from a portion of second closure end **114b** which includes extension **115a**. Region **114c** contacts an inner surface of body **112** when closure **114** is opened. In a preferred embodiment, region **114c** is received into receiving groove **112d** when closure **114** is opened. Closure **114** defines slot **1168** which is pivotally attached to pin **116**. In the embodiment shown, slot **116a** has an oval shape. FIG. 10B is a side view of an alternate embodiment of closure **114** in which slot **116b** is keyhole shaped. Preferably, closure **114** is fabricated from nonmagnetic material, more preferably, non-magnetized ferromagnetic material.

FIG. 11 is a side view of hook **100** depicting closure **114** in the closed position i.e., spanning the space between second closure end **119** and hook body **112**. In the closed position, one curved end of oval slot **116a** is shown nested against or contacting pivot **116** with a gap **a** between pivot **116** and the opposing end of oval slot **116a**. Also shown is gap **a'** between groove wall **112c** and closure edge **117**. Gaps **a** and **a'** are approximately equal in size. Gap **b** is shown between offset **115** and second hook end **119** and is larger than gaps **a** and **a'**. Closure magnet **118a** is shown embedded in closure **114** proximate to first closure end **114a** opposite neck groove **112b**. It can be seen that neck magnet **118** and closure magnet **118a** are opposed to each other and also offset from each other. Preferably, magnets **118** and **118a** are the same size and have equal and opposite magnetic force (opposite polarity). By offset is meant that magnets **118** and **118a** do not align perfectly when closure **114** is in the closed position such that,

for example, the ends of the two magnets do not align when closure 114 is closed. Neck magnet 118 and closure magnet 118a are of opposite polarity and are used to hold closure 114 in the closed position by magnetic force. As seen in FIG. 11, lip 113 is also used to retain closure 114 in the close position. Pin 116 is circular in shape.

In a preferred embodiment, closure magnet 118a in closure 114 is offset preferably $\frac{1}{3}$ to $\frac{1}{2}$ of its length from neck magnet 118 when it is rotated to the closed position. Because the opposing sides of the offset alignment and opposing magnets 118 and 118a are of opposite polarity, as magnet 118a approaches magnet 118, closure magnet 118a, and consequently closure 114, is pulled onto lip 113 by magnetic attraction from neck magnet 118 once closure end 114a and closure magnet 118a initially contact neck groove 112b. It is also evident that extension 115a must extend far enough to contact and preferably overlap, second end 119 in the closed position.

FIG. 12 is a side view of hook 100 in which closure 114 is pushed forward off lip 113. Pivot 116 can be seen contacting the opposite curved end of oval shaped slot 116a.

FIG. 13 is a side view of hook 100 showing closure 114 in the open position. Closure 114 is pivoted so that second closure end 114b is lifted off second hook end 119. To pivot closure 114 to the open position, closure 114 is slid or pushed forward generally toward second body end 119 by the user so that pivot 116 contacts the opposite end of the oval slot 116a creating a gap aa which is approximately equal in length to gap a seen in FIG. 11 and smaller than gap b. It will be noted that this allows closure 114 to slide forward and off lip 113 thereby unlocking closure 114 from the closed position. Referring to FIG. 11, it can be seen that the presence of gap b and offset 115 allows closure 114 to be pushed toward second hook end 119. Because gap b is larger than either of gaps a and a', first closure end 114a can be pushed off lip 113 when closure 114 is pushed forward toward second hook end 119 until slot 116a rests against pivot 116 because the greater size of gap b provides sufficient room to push closure 114 until first closure end 114a is pushed off lip 113 allowing it to be rotated away from neck groove 112b.

When closure 114 is rotated to the closed position, the opposite polarities of neck magnet 118 and closure magnet 118a attract first closure end 114a toward neck groove 112b while the offset orientation of the magnets creates a pulling force that pulls first closure end 114a onto lip 113 and afterwards continues to hold it between neck groove 112b and lip 113.

It can be seen that the structure of hook 100 helps to prevent the accidental opening of closure 114. A positive push of closure 114 toward second end 119 is required so that lip 113 no longer prevents its rotation into the open position. Significant also is the shape of slot 116a and the offset shape 115 of second closure end 114b. The offset shape allows second closure end 114b to contact second hook end 119 to keep hook 100 closed and still allow closure 114 to be pushed sufficiently forward to move first closure end 114a off lip 113 and to be rotated open. Therefore, hook 100 can hold items such as rings, ropes, etc. in the area defined by hook body 112 and closure 114 in the closed position. Because first closure end 114a rests between lip 113 and neck groove 112b, it is confined between hook neck 112a (and neck groove 112b) and lip 113 preventing it from accidentally opening.

FIG. 14 is a side view of hook 100 depicting an alternate embodiment of closure 114 with slot 116b having a keyhole shape with rectangular and circular portions and pivot 116' having an oval shape. Lip 113 may be removed from this second embodiment. Preferably, the size of oval pin 116b and the straight portion of keyhole slot 116' are sized so that

closure 114 is locked into the closed position so that it cannot rotate when pin 116b is in the rectangular portion of keyhole slot 116'. This locking position of pin 116' is combined with the pulling and closing magnetic force between neck groove 112b and first closure end 114a, caused by the opposite polarity and offset positioning of neck magnet 118 and closure magnet 118a, which keeps closure 114 closed and prevents the accidental or inadvertent opening of hook 100.

FIG. 15 is a side view of the alternate embodiment of hook 100 showing closure 114 pushed toward second hook end 119. Oval pivot pin 116' is located in the wider circular portion of keyhole slot 116b after closure 114 is pushed the distance of gap a seen in FIG. 14. With oval pin 116b in the circular portion, closure 114 is able to rotate into the open position as the circular portion of slot 116' rotates around pin 116b. It will be recognized that by pushing closure 114 toward second hook end 119, closure magnet 118a is moved away from neck magnet 118. Because gap b is larger than gap a, there is sufficient clearance to allow closure 114 to be pushed so pivot 116' is in the circular portion of keyhole slot 116b enabling closure 114 to rotate open.

FIG. 16 depicts hook 110 provided with keyhole slot 116b in the open position. Pin 116' and the circular portion of slot 116b are sized to allow rotation or pivoting around pin 116' is sized to enable closure.

Finally, in both embodiments, a collar similar to collar 25 discussed above may enclose neck 112b and first end 114a of closure 114.

It can be seen that both forms of the alternate embodiment of hook 100 discussed above provide both a mechanical locking mechanism and a magnetic closing force on closure 114 in the closed position both of which are defeated by the ability to slide closure 114 forward because of the gaps configured in the pivotal connection of closure 114 to body 112 and between second closure end 112b and second end 119. The offset arrangement of neck magnet 118 and closure magnet 118a causes first closure end 114a to be automatically pulled into correct closing position without additional adjustment by the user.

Thus it is seen that the objects of the invention are efficiently obtained, although changes and modifications to the invention should be readily apparent to those having ordinary skill in the art, which changes would not depart from the spirit and scope of the invention as claimed.

I claim:

1. A hook comprising:

- a body having a neck and formed into a hook shape and fabricated from nonferromagnetic material, said body having a first end and a second end;
- wherein said neck is proximate to said first end;
- a neck groove in said neck and proximate said first end to receive a first closure end;
- a closure having said first closure end and a second closure end and fabricated from nonmagnetic ferromagnetic material, said closure pivotally attached to said body and positioned to span a space between said second end and said body; and,
- at least one neck magnet fixedly attached to said neck groove;
- wherein said at least one neck magnet holds said closure in a closed position that spans said space;
- wherein said hook encloses a defined area in said closed position and,
- wherein a pivotal attachment is substantially toward a center of said closure between said first closure end and said second closure end.

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2. The hook as recited in claim 1 further comprising at least one closure magnet fixedly attached to said closure and having an opposite polarity of said at least one neck magnet.

3. The hook as recited in claim 1 further comprising a receiving groove formed on an inner side of said hook shape and facing said defined area wherein said receiving groove receives said closure in an open position.

4. The hook as recited in claim 1 wherein said second closure end and said second end of said hook are configured to matingly fit together in said closed position.

5. The hook as recited in claim 1 further comprising a collar, wherein said collar is positioned to slidably enclose said neck and said closure in said closed position thereby locking said closure in said closed position.

6. The hook as recited in claim 5 wherein said collar is fabricated from ferromagnetic material.

7. The hook as recited in claim 1 further comprising a ring attached to said first end.

8. The hook as recited in claim 1 wherein the first end of said closure and said neck groove are configured to matingly fit together in said closed position.

9. A hook comprising:

a body having a neck and formed into a hook shape and fabricated from nonferromagnetic material, said body having a first end and a second end wherein said neck is proximate to said first end;

a pin centrally attached to said body;

a closure having a first closure end and a second closure end and fabricated from nonmagnetic ferromagnetic material, said closure having a slot and pivotally and slidably attached to said pin and positioned to span a space between said second end and said body in a closed position;

a first gap having a length between one end of said slot and a pivot attachment in said closed position;

a neck groove formed in said neck to receive said first closure end and including a groove wall proximate a first body end;

at least one neck magnet fixedly attached to said neck groove; and,

at least one closure magnet fixedly attached to said closure proximate said first closure end;

wherein said at least one neck magnet and said at least one closure magnet are offset from each other and of opposite polarity and hold said closure in said closed position that spans said space; and,

wherein said hook encloses a defined area in said closed position.

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10. The hook as recited in claim 9 further comprising a receiving groove formed on the inner side of said hook shape and facing said defined area wherein said receiving groove receives said closure in an open position.

11. The hook as recited in claim 10 further comprising a receiving magnet in said receiving groove.

12. The hook as recited in claim 9 further comprising a collar, wherein said collar is positioned to slidably enclose said neck and said closure in said closed position.

13. The hook as recited in claim 12 wherein said collar is fabricated from ferromagnetic material.

14. The hook as recited in claim 9 further comprising a ring attached to said first end.

15. The hook as recited in claim 9 wherein said slot is oval in shape.

16. The hook as recited in claim 15 wherein said pin is circular.

17. The hook as recited in claim 16 further comprising a lip extending from said body and facing said neck groove, said lip maintaining said closure in said closed position.

18. The hook as recited in claim 16 further comprising a second gap between a groove wall and a closure edge, said closure edge at an end of said first closure end and wherein a length of said second gap is equal to or less than said length of said first gap.

19. The hook as recited in claim 16 wherein said second closure end includes an offset shape forming a third gap between said offset shape and second body end in said closed position and wherein a length of said third gap is greater than said length of said first gap.

20. The hook as recited in claim 9 wherein said slot is a keyhole shape having a rectangular portion and a circular portion.

21. The hook as recited in claim 20 wherein said pin is oval.

22. The hook as recited in claim 21 wherein said second closure end includes an offset shape forming a second gap between said offset and a second body end in said closed position and wherein a length of said second gap is greater than the length of said first gap.

23. The hook as recited in claim 21 wherein an oval pin is positioned in said rectangular portion of said keyhole in said closed position.

24. The hook as recited in claim 21 wherein an oval pin is positioned in said circular portion of said keyhole in an open position.

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