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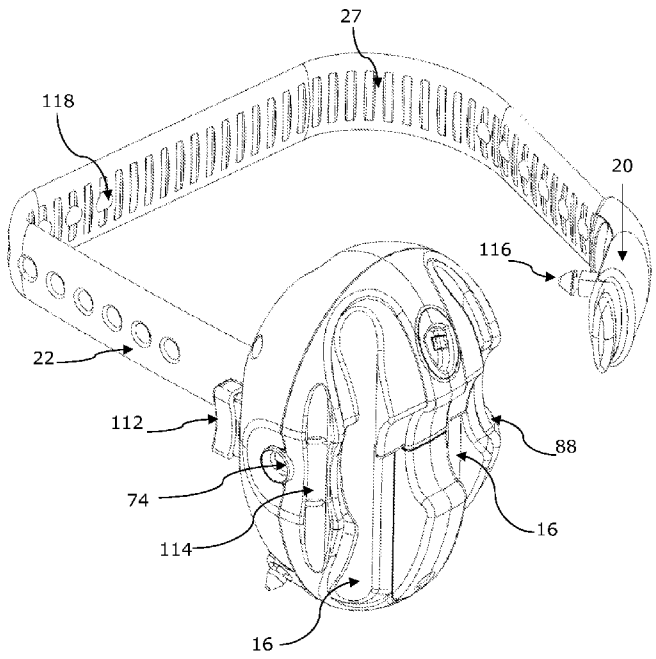

Figure 12

(57) Abstract: The present invention concerns a snowboard locking device (1010) for securing a snowboard (1124), and a ski locking device (10) for securing a pair of snow skis (122) and/or ski poles. The locking devices comprise a recess (28) for receiving, respectively, at least part of a snowboard, or part of a pair of skis (122) arranged with their slide surfaces in abutting relationship. The ski locking device comprises at least one opening (16) for receiving a pair of ski poles (120). A flexible strap (22) passes through a lockable closure member (20). One end of the strap (22) is connected to the housing. The other end (94) of the strap (22) can be attached by the closure member (20) to the side of the housing (12). The strap (22) then forms a loop around the housing (12), for retaining the snowboard (1124), or the skis (122) and ski poles (120). Electronic and mechanical locking means are provided.

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Portable Locking Device

Technical Field

The present invention relates to a portable locking device. In particular, the portable locking device may be configured for securing a snowboard, or for securing snow skis and/or ski poles.

Background

Snowboards and skis are occasionally lost to theft or unintentional mix up, when left unattended in ski resorts. This may happen, for example, outside mountain restaurants and cafés, where many hundreds of snowboards and/or pairs of skis may be deposited from time to time. It is also possible in Hotel Ski/boot rooms, and outside village bars and restaurants.

Portable security devices have therefore been developed for the ski market. These include, for example, cable or chain combination locks. Some known locks enable one or more snowboards or sets of skis to be secured together and/or to other permanent fixings such as a ski rack or the like. Such locks tend to be marketed as ski locks, but many are in fact generic combination cable or chain locks, which may be used for securing other portable high value items such as bicycles and luggage.

Dedicated ski locks have been developed, including for example locks of the type disclosed in US4111015. In US4111015, the skis are locked in a crossed position so as to discourage theft when left unattended for short periods of time. The ski lock disclosed in US4111015 comprises male and female brackets, which are secured to respective skis for mutual engagement and disengagement. A combination lock is provided on one of the brackets. The male and female security brackets are attached to the upper surface of the skis adjacent the bindings, so that the skis may be locked together in an X configuration.

US4057983 provides a hinged clamp, for locking skis together. US4146242 also provides a two-part lock for a pair of skis, and the two parts may be connected by a hinge.

There are various disadvantages associated with this type of ski lock, particularly since the intention is just to discourage theft when the skis are left unattended in a ski resort. Many ski locks do not provide security for the ski poles. Nor can they be used to provide additional security, by enabling the skis to be secured to fixed structures.

Dedicated snowboard locks have also been developed. The locks of US7431322, US5904056 and WO0187434 affix a lock to the boot bindings of the snowboard. In

US5904056, a retractable cable is used to secure the board and lock to a permanent fixture. US6192719, US6089054 and DE202010001954 also affix the lock to the board, although not at the bindings, and incorporate a cable to attach the lock to a fixed structure. US5675999, US6263709 & US6012739 appear to utilise a form of clamp-like structure that secures around the width of the snowboard, with an additional cable or strap to attach to a fixed structure.

Other examples of locking devices are known from JP2007160074, US2003094022, JP63194683, US5675999, US2004011091 and WO9807478.

However, known prior art locks for snowboards have disadvantages. The locks that affix to the boot bindings, or at another point on the board, have the disadvantage that they may add weight to the snowboard. This has the further effect of altering the balance for the boarder. They also have to be affixed to the board before use, and be retained using locking screws or other tamper-proof means. Such locks are not readily transferable between snowboards.

The snowboard locks that are formed as clamps are rigid. Storage of such locks is therefore a problem. The lock of US6012739 is hinged, to allow compact storage. The cables used in some of these locks are awkward to wind up, which makes storage awkward when the lock is not in use.

Summary of the Invention

According to a first aspect of the invention there is provided a ski locking device in accordance with appended claim 1.

According to a second aspect of the invention there is provided a method for securing a pair of snow skis and/or ski poles in accordance with appended claim 18.

According to a third aspect of the invention there is provided a snowboard locking device in accordance with appended claim 19.

According to a fourth aspect of the invention there is provided a method of securing a snowboard in accordance with claim 32.

The invention therefore provides two distinct configurations of locking device. These configurations are respectively capable of securing skis and poles in a single device, or a snowboard in a single device. In the ski locking device, different elements of the device are provided for securing both the ski poles and the skis. The locking devices of both configurations of the invention have the advantage of being portable.

The locking devices may provide both mechanical and electronic locking. Mechanical locking is achieved through a clasp mechanism, which locks the flexible strap to the side of the housing of the locking device. An `iButton` provides secure electronic locking of the portable locking devices.

The flexible strap of the invention may be additionally used to form a loop around a permanent fixture, to which the snowboard, or the skis and/or poles, may be secured. Preferably however, embodiments are envisaged in which the locking devices of the present invention further comprise a cable lock or the like for locking the devices to an external fixture such as a ski rack, fence post, ski locker, roof rack of a vehicle, or the like. In preferred embodiments the cable lock includes a cable reel integral with the housing of the locking device. In this way the cable from the reel may be wound out and wrapped around other equipment such as another set of skis or snowboard(s) or the like, and additionally or alternatively used to secure the locking device, to a permanent external fixture. The end of the cable may be secured in a recess in the housing of the locking device by the closure member.

Preferably, there is at least one opening in the ski locking device for the ski poles, with the recess for the skis located on the opposite side of the housing. In this way, the skis and poles can be separated in such a way that they do not interfere with each other when retained in the ski locking device. This configuration also provides for a more compact arrangement which lends itself to the portable nature of the ski locking device of the present invention.

In preferred embodiments of the ski locking device, a pair of openings is provided in the housing, each for receiving a respective ski pole. In this way the ski poles can be retained separately from one another in the housing. Thus, the present invention contemplates embodiments where the skis are retained separately from the ski poles and the ski poles are retained separately from each other in the housing.

In preferred embodiments of the ski locking device, the openings are arranged in side-by-side spaced relation with the recess located in an intermediate plane between the openings. This arrangement provides for greater structural integrity of the housing since the openings and recesses are distributed around the housing in planes offset from one another so as to maintain the stiffness of the housing. In preferred embodiments, the housing comprises a moulded plastic and cast aluminium structure.

In preferred embodiments of both the snowboard- and ski locking devices, when the closure member is in its closed position, the closure member is locked to the side of the housing and retains the strap. The strap then lies around the housing, outside the recess. In the ski locking device, the strap also lies outside the at least one opening. In this way the closure member may be of a more lightweight construction, since it is positioned away from the retained snowboard or skis when in its closed position, thereby minimising any damage the relatively heavy snowboard or skis may otherwise cause to the closure member, due to any mishandling of the snowboard, skis or locking device in use.

In preferred embodiments of both the snowboard- and ski locking devices, the closure member is removably attachable to the housing. Thus the closure member may be removed entirely from the housing yet remain attached to the housing via the flexible strap.

In preferred embodiments of both the snowboard- and ski locking devices, the closure member preferably has a shape and size which conforms to the part of the housing over which it lies when attached to the housing in its closed position. In this way, the ski locking device can be of a compact and practical and portable design. In preferred embodiments a recess is provided on the housing for receiving the closure member in such a way that the closure member is relatively flush with the housing when in its closed position.

Preferably the housing is generally ovoid. The ovoid shape of the housing readily lends itself to the concept of a robust lightweight portable locking device. The device may therefore be stored in a rucksack carried by a skier, and/or may be readily carried in the pocket of a ski jacket.

Preferably the snowboard and ski locking devices of the present invention further comprise a latch for locking the closure member in its closed position. In preferred embodiments, the latch is electronically operated. Preferably, the latch is operated by means of electronic locking means, the electronic locking means being located within the housing of the device.

In preferred embodiments of both the snowboard- and ski locking devices, the locking means is releasable by means of a unique electronic key, for example a key having a unique id address. Preferably the locking means is releasable by means of a contact or contactless electronic key having a unique electronic id address. The locking means may incorporate an electronic contact key of the type which conforms to an electronic communications protocol

such as 1-Wire (RTM) or the like. The present invention therefore contemplates embodiments in which the lock is operated by means of an iButton which conforms to the 1-Wire (RTM) communications protocol. Thus, the present invention readily contemplates embodiments incorporating relatively inexpensive electronic lock devices of a well known and tried and tested technology.

In preferred embodiments of both the snowboard- and ski locking devices, the length of the strap is adjustable to accommodate different size snowboards or skis in the loop. The strap may pass through the closure member and be locked to the closure member and the housing when the closure member is locked, the length of the strap being adjusted by sliding the strap through the closure member prior to locking.

In preferred embodiments of both the snowboard- and ski locking devices, the strap includes a series of surface projections on one side, the projections on the strap engaging corresponding projections on an interior surface of the closure member and/or engaging with the edge of a snowboard or the edges of skis lying within the loop.

The strap may comprise a series of holes. The closure member may be removably attachable to the side of the housing, using a clasp pin, the clasp pin passing through a selected hole in the strap, thereby locking the strap to the closure member and the housing when the closure member is locked, and fixing the length of the loop. Preferably the clasp pin may comprise at least one fixing screw element, which secures the end of the strap in its adjusted position.

The strap may comprise two or more cut-resistant cables, overmoulded with a grade of thermoplastic elastomer. At least the outer surface of strap 22 may be silicone.

The snowboard locking device of the invention does not interfere with the balance of a snowboard whilst the snowboard is in use. This because the snowboard locking device is not permanently fixed to the snowboard.

In both locking devices, one end of the flexible strap is permanently anchored at the lock housing. However, the flexible strap is still adjustable to provide a loop that accommodates different sizes of board or skis. In the snowboard locking device, this may be achieved by confining the board at its narrowest point.

Being flexible, the strap can be wrapped around either locking device for more compact storage. The integral cable is retractable, which may offer similar advantages for storage, and reduced risk of entanglement with clothing or rucksacks when storing the locking devices.

Brief Description of the Drawings

Various embodiments of the invention will now be more particularly described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of a ski locking device according to an embodiment of the invention, with the locking device shown in its closed configuration.

Figure 1a is a perspective view of a snowboard locking device according to an embodiment of the invention, with the locking device shown in its closed configuration.

Figure 2 is a perspective view of the ski locking device of Figure 1, viewed in direction A as indicated in Figure 1.

Figure 2a is a perspective view of the snowboard locking device of Figure 1a, viewed in direction A as indicated in Figure 1a.

Figure 3 is another perspective view of the ski locking device of Figure 1, as viewed in direction B.

Figure 4 is another perspective view of the ski locking device of Figure 1, as viewed in direction C.

Figure 4a is another perspective view of the snowboard locking device of Figure 1a, as viewed in direction C.

Figure 5 is a plan view from above of the ski locking device of Figure 1

Figure 5a is a plan view from above of the snowboard locking device of Figure 1a.

Figure 6 is a front view of the ski locking device of Figure 1.

Figure 7 is a rear view of the ski locking device of Figure 1.

Figure 7a is a rear view of the snowboard locking device of Figure 1.

Figure 8 is a left hand side view of the ski locking device of Figure 1.

Figure 8a is left hand side view of the snowboard locking device of Figure 1a.

Figure 9 is a right hand side view of the ski locking device of Figure 1.

Figure 10 is an internal view of the ski locking device of an embodiment of the invention showing the elements of the lock located within the housing.

Figures 11a and 11b are respective plan and side elevation views of the main operating parts of the lock.

Figure 12 is a perspective view from the front of the ski locking device of Figure 1, with the locking device in its open configuration.

Figure 12a is a perspective view from the front of the snowboard locking device of Figure 1a, with the locking device in its open configuration.

Figure 13 is an exploded perspective view of the closure member, and the elements that attach the first end of the strap to the housing, using the example of the strap for the ski locking device.

Figure 14 shows the ski locking device in use, attached to a pair of skis and a pair of ski poles.

Figure 14a shows the snowboard locking device in use, attached to a snowboard.

Detailed Description

Referring to the drawings, the figures show details of the hand portable locking devices of the invention.

Figures 1-9 and 12-13 without the suffix `a` show details of the ski locking device.

Figures 1a, 2a 4a, 5a, 7a, 8a and 12a show details of the snowboard locking device. Each of the views of the snowboard locking device, for example figure 7a, has been selected to show the same perspective as the similarly numbered figure for the ski locking device, for example figure 7.

Figures 10, 11a and 11b show internal mechanisms that are common to both the ski locking device and the snowboard locking device.

Figure 14 shows the ski locking device in typical use, to lock together a pair of skis and ski poles.

Figure 14a shows the snowboard locking device in typical use, to lock a snowboard.

Figure 1 shows a hand portable ski locking device 10 according to an embodiment of the present invention. Ski locking device 10 comprises a two-part housing 12, provided by separate half-shell moulded parts 12a and 12b.

The half shells 12a and 12b are preferably of a moulded plastic and/or alloy construction. Half shells 12a and 12b may be joined together permanently along the mid plane 14 of the housing upon assembly of the locking device 10. In preferred embodiments of the present invention, the moulded half shell parts 12a and 12b are joined together by tamper proof

fixing screws 13, see Figure 7. They may therefore be separated to allow access to the internal parts of the ski locking device. Such access may be for maintenance, or other purposes.

Housing 12 has a generally ovoid shape. The length along the major axis of housing 12 may be about 100 mm (4 inches) or so, and the width dimension along the minor axis may be about 75 mm (3 inches) or so. The dimensions of ski locking device 10 are such that the device can be readily carried in the pocket of a ski jacket or other garment, without undue stress on the pocket. Alternatively, ski locking device 10 can be carried in a small rucksack of the type used by skiers.

As can best be seen in the drawings of Figures 1, 4-6 and 12, half shell 12a comprises a pair of elongated openings in the form of adjacent parallel slots 16. Slots 16 extend along the length of half shell 12a, in the direction of the major axis of the housing 12. The openings 16 each have a generally U-shape cross section, which is of sufficient size to accommodate the majority of ski poles in use today.

A resilient element 18, best seen in Figures 1, 5, 6 and 12, is provided in each of the openings 16 towards a top end thereof, for engagement with the tubular body of a respective ski pole when inserted in the opening, in use. As can best be seen in the drawings of Figures 1, 6 and 13, the resilient elements 18 are positioned towards the ends of the respective slots 16.

The ski locking device 10 also comprises closure member 20 and a flexible locking strap 22. Ski locking device 10 may alternatively be constructed with a cable in place of strap 22. In order to limit the number of drawings and provide a consistent description, only embodiments of the ski lock and snowboard lock with a strap have been illustrated in any of the figures.

Figure 1a shows a corresponding perspective to figure 1, for the snowboard locking device of the invention. Strap 1022 of figure 1a is clearly longer than that shown in figure 1, in order to accommodate the generally greater width of a snowboard in comparison to a pair of skis. The pair of openings 16 for the ski poles in figure 1 are also absent from the housing half shell 1012a shown in figure 1a.

Figures 1 and 1a both show key contact port 80, whose function is described later.

Figure 2 shows the flexible strap 22, which is secured at one end to the housing 12 through an aperture 24 in the half shell 12b. At its other end 94, shown in figure 13, the flexible strap 22 is secured to, and by, closure member 20.

Closure member 20 takes the form of a clasp, which can be secured to the housing 12. Alternative arrangements are possible. For example, the strap 22 could enter the housing 12 at a point part way along the strap`s length, and the closure member 20 could then be adapted to attach both ends of the strap to the housing, thereby creating two shorter loops.

Figure 2a shows a corresponding perspective to figure 2, for the snowboard locking device of the invention. Strap 1022 is clearly visible as being longer than strap 22 in figure 2. Strap 1022 can provide a substantially larger loop than strap 22 in figure 2.

Closure member 20 is shown in its closed position in Figures 2 and 2a, but can be seen in the open position in figures 12, 12a and 13. Strap 22 and strap 1022 pass through their respective closure members 20. Straps 22 and 1022 are each locked to the closure member 20 and the side of the housing 12, 1012 when the closure member is locked. The length of each strap 22 or 1022 is adjustable by sliding the strap through the closure member 20, prior to locking. A loop is formed by the portion of strap 22 or 1022 between the end first attached to half shell 12b or 1012b and the point on the strap that is locked to the housing by closure member 20.

Closure member 20 comprises a fixing pin 116, which secures the end of the strap in its adjusted position. See figures 12 and 13 for fixing pin 116. Fixing pin 116 may comprise a screw, which can be screwed into closure member 20 through any particular one of multiple holes 118 in strap 22 or strap 1022. A separate tool, not shown, may be provided for removing and inserting fixing pin 116. This may be done in order to select a different hole in the strap 22 or 1022, thereby selecting a different length of the loop.

Strap 22 or 1022 may comprise an inner reinforcement of one or more cables 96, shown in figure 13. These may preferably be galvanised steel or stainless steel cables, which are cut -resistant. The cables 96 are covered by an outer layer of resilient material, which may be an overmoulding. This resilient material may, for example, be silicone, rubber, neoprene or thermoplastic elastomer, in a moulded form or the like.

Each of straps 22 and 1022 forms a loop around the locking device when the closure member 20 is moved to its closed position. The side of each flexible strap which forms the inward facing surface of the loop is provided with a series of rib protrusions 27. In ski locking device 10, these rib protrusions 27 provide for additional frictional engagement with skis passing

through the loop in use. In snowboard locking device 1010, these rib protrusions 27 provide for additional frictional engagement with a snowboard passing through the loop in use.

In one illustrative embodiment, the total length of the board lock strap 1022 may be 694mm. In another illustrative embodiment, the total length of the ski lock strap 22 may be 463mm. Thus the board lock strap is 231mm longer than the ski lock strap, which is approximately 50% longer. This board lock strap 1022 may accommodate a snow board of 245mm width at the `waist`, i.e. the part of the snowboard between the boot bindings.

The length of the portion of each strap 22, 1022 that forms the loop is adjustable in the embodiments that have been illustrated, but alternatively may be fixed.

As can best be seen in the drawing of Figure 2, the half shell 12b of the ski locking device is provided with a central elongated recess, or channel, 28. Recess 28 extends substantially along the entire length of the half shell 12b, centred on a median plane 30 of the housing that lies intermediate the openings 16 on the half shell 12a, see reference 30 in figure 2. Median plane 30 is perpendicular to mid-plane 14 shown in figure 1.

The recess 28 has a generally U-shape cross section. Recess 28 is sized to accommodate the cross section profile of a pair of skis 122, shown in figure 14a, when arranged with the slide surfaces in abutting relationship. In one exemplary embodiment, recess 28 may have a width of 14mm. Recess 28 is adapted to receive one side of the pair of skis 122, with strap 22 passing around the other side of the skis. This arrangement may ensure that the skis 122 are retained securely within the loop created by the flexible strap 22, when the closure member 20 is in its closed position.

The depth dimension of the recess 28 is sufficient to prevent removal of the skis positioned in the loop when the closure member 20 is closed. The depth of the recess 28 may be influenced by considerations of modern ski design. Skis generally have a concave edge profile (camber) such that they are wider at both the tips and tails than at the mid region, where bindings are typically attached. In this respect it will be readily understood by those skilled in the art that skis may be securely retained in the loop created by the flexible strap 22, when the skis are confined within the recess 28 and the loop formed by the strap 22. This results from the strap being positioned around the skis, at an intermediate point between the wider tips and tails of the skis. The recess 28 is provided with a wear resistant lining 29 of a suitable resilient

material, to prevent chaffing of the moulded housing and blunting of the metal edges of the skis located therein.

In practice, it is envisaged that the ski locking device would be secured around the skis forward of the bindings, to allow sufficient drop for the ski poles secured in the openings 16 on the opposite side of the housing. This can be seen from figure 14, which has been provided to show ski locking device 10 in use, around a pair of skis and a pair of ski poles. Figure 14 is described later.

As can best be seen in the drawing of Figure 2a, the half shell 1012b of the snowboard locking device 1010 also has a recess 1028. The width of recess 1028 is sufficient for common thicknesses of snowboards. In one exemplary embodiment, recess 1028 may be of width 14mm, and therefore be of the same width as the recess 28 mentioned in the illustrative embodiment for recess 28 in figure 2. However, recess 1028 may be fitted with a resilient element, formed as an `over-moulding`, that:

(i) Is of greater volume than that used within recess 28, in order to support the weightier bulk of a snowboard; and

(ii) Has larger protruding ribs 29 than the ribs in the resilient member within recess 28, in order to provide more traction/grip to the side of the snowboard.

The depth dimension of the recess 1028 is sufficient to prevent removal of a snowboard 1124, see figure 14a, when the closure member 20 is closed. As also shown in figure 14a, the snowboard locking device may be fitted between the bindings that are on the upper surface of a snowboard 1124. Figure 14a is described later.

Ski locking device 10 and snowboard locking device 1010 of the present invention are provided with further functionality in the form of a cable reel lock. Figures 2, 2a, 4, 4a and 10 show various aspects of the cable reel lock. Half shells 12a, 12b and 1012a, 1012b define an internal space that houses a reel of cable 44; see the lower part of figure 10.

Reel of cable 44 forms part of a cable lock device. The cable lock device may be used for securing the locking device 10, 1010 to an external fixture such as a ski rack, ski locker, fence post or the like. Reel 44 may comprise a metre or so of cable, preferably 900mm, which can be reeled out through an opening 46 in the housing. This length is suitable for securing the locking means to a fixture such as a post or tree. However, it may be possible that some users would wrap cable reel 44 around another snowboard or pair of skis.

Figures 2 and 2a both show the opening 46 and the end of the cable 48. The end of the cable 48 can be passed around the external fixture, and then locked into an aperture. This aperture may take the form of secondary cable lock recess 114, shown in figure 4 and figure 4a, on the main ovoid part of the half shell 12a or 1012a. Recess 114 lies underneath the closure member 20.

The reel 44 is spring loaded for ease of retraction as is well known in the art. The reel 44 is secured by clips or other fixing means, which retain the reel for ease of assembly. The end 48 of the cable is retained in the aperture 114 by locking of closure member 20. Closure member 20 prevents removal of end 48 of the cable from aperture 114, as long as closure member 20 remains locked to the body of the locking device 10 or 1010. The design of aperture 114 shown in figures 4 and 4a allows cable end 48 to be inserted into aperture 114 in either orientation. Therefore, in terms of the orientation of ski locking device 10 or snowboard locking device 1010, cable end 48 may either:

(i) Be pulled out and wrapped around an object below ski locking device 10 or snowboard locking device 1010, in which case cable end 48 would be inserted into aperture 114 from below; or

(ii) Be pulled out and wrapped around an object above ski locking device 10 or snowboard locking device 1010, in which case cable end 48 would be inserted into aperture 114 from above.

Whichever direction cable end 48 lies in aperture 114, it will be retained under closure member 20.

Figure 3 is another perspective view of the ski locking device of Figure 1, as viewed in direction B. Recess 28 is clearly visible in half shell 12b.

Figure 4 is a perspective view of the ski locking device of Figure 1, as viewed in direction C. **Figure 4a** is a corresponding perspective view of the snowboard locking device of Figure 1a, as viewed in direction C. Figures 4 and 4a show the point where the end of the cable reel lock 48 emerges from the housing in the foreground of each figure.

Figure 5 is a plan view from above of the ski locking device of Figure 1. **Figure 5a** is a corresponding plan view from above of the snowboard locking device of Figure 1a. Figures 5 and 5a show the depth of recesses 28 and 1028. The general shape of housings 12 and 1012, and the relative lengths of straps 22 and 1022 are also clearly discernable.

Figure 6 is a front view of the ski locking device of Figure 1. The size and configuration of the openings 16 for the ski poles in ski locking device 10 are clearly shown.

Figure 7 is a rear view of the ski locking device of Figure 1. **Figure 7a** is a corresponding rear view of the snowboard locking device of Figure 1. Tamper proof screws 13 and opening 46 for the cable reel lock are clearly shown.

Clasp release button 112 is shown towards the right of figure 7. Clasp release button 7 is operable by a user of the snowboard locking device 1010 or the ski locking device 10 to mechanically open clasp 20, and hence the locking device.

Figure 8 is a left side elevation view of the ski locking device of Figure 1. **Figure 8a** is a corresponding left side elevation view of the snowboard locking device of Figure 1a. The relative width of straps 22, 1022 and the housings 12, 1012 for each locking device 10, 1010 are clearly shown

Figure 9 is a right side elevation view of the ski locking device of Figure 1. A comparison with figure 8 shows clearly the position occupied in figure 8 by the clasp 20, which is very prominently visible in the left side elevation view of figure 8.

The internal parts of the ski locking device 10 and snowboard locking device 1010 are described with reference to Figures 10, 11a and 11b.

Figure 10 shows the internal components of the locking devices. The locking devices include an electric motor 68, which is shown at the left edge of figure 10. Electric motor 68 is attached to, and turns, a worm 66. Worm 66 is in constant meshed engagement with a first gear wheel. Electric motor 68 is controlled by an appropriate controller configured on a PCB 70.

The first gear wheel lies behind the region generally indicated with reference 62 in figure 10. The left edge of the first gear wheel is visible, and is illustrated in engagement with worm 66. The first gear wheel drives second gear wheel 63, which is visible in the centre of figure 10. The first gear wheel and second gear wheel 63 may be rotatably mounted in meshing engagement on an elongated support member 64, which is removably secured to the interior surface of the half shell 12a or 1012a.

A six lobed rotatable geared disk element 60 is mounted on second gear wheel 63. However second gear wheel 63 and six lobed rotatable geared disk elements 60 may instead be formed as a single component.

In addition, a further idler gear may lie between the first gear wheel and the second gear wheel 63. In this embodiment, the motor 68 is attached to the worm 66, and the worm drives the worm gear, which drives an idler gear, which drives the six lobed cams 60. The embodiment shown in figure 10 may therefore comprise up to five different gears, and the second gear wheel 60 and six lobed cam 63 may in various embodiments be moulded together or replaced by a single component.

The six lobes on the gear wheel 60 are at equal 60 degree spacings. The position of one of the lobes is sensed by a micro switch 72. Micro switch 72 senses the position of the second gear wheel 60 when one of the lobes acts on the mechanical latch of the lock, generally indicated at 74. When the mechanical latch is unlocked, the micro switch is in the trough of the cam. When the mechanical latch is locked, the micro switch is on the peak of the cam. Figure 10 shows the cam in the locked position.

Release button 112 is shown towards the right of figure 10. In the locked position shown in figure 10, release button 112 cannot be pushed down, because the cam lobe prevents it from moving. See also figure 11a, where the plastic release button 112 has been omitted, in order to show the lock striker plate underneath it.

In preferred embodiments, the controller 70 on the PCB is configured with logic. This is in accordance with the well known 1-Wire (RTM) low bandwidth communication protocol by Dallas SemiConductor Corp. for use with standardised electronic keys, such as iButton or the like. In such systems, a relatively inexpensive contact electronic key having a unique identification address is used to operate the locking devices of the invention.

In operation, the latch will be released when second gear 60 moves from the position shown in figure 10 to a position where one of the six lobes engages the latch. The closure member 20 is thereby unlocked from the latch 74, by movement of the lobe which causes movement of the latch 74 to its unlocked position. Likewise, further rotation of the gear wheel 60 by the motor will cause the latch 74 to be reset for locking engagement with the pin 116 of the closure member 20.

Release of the latch locking the closure member 20 also releases the locking element for the cable lock 44. So contact with an electronic key such as an iButton, at a key contact port 80, will cause the locking device to become unlocked. A user may operate clasp release button 112, in order to mechanically separate the pin 116 from latch 74.

Security is ensured by the unique id address of the key. In the case of the iButton, there are many billions of unique addresses. So the same key will not open another lock of the type disclosed. The key contact port 80 constitutes an iButton receptacle. This receptacle has two electrical contacts for electrical connection with the iButton key, and an LED indicator for providing visual indications to the user during operation, for example to signal that the lock has been released or re-set.

Figures 11a and 11b show the internal workings may be assembled in a modular way on the support member 64. Conventional batteries 78 may be mounted on the other side of the support member 64, to provide power for the lock.

When the clasp is in position, a magnet in the clasp trips a reed switch, which is visible in figure 11b. Tripping of the read switch informs the controller that the clasp pin is in the lock and ready to operate. Only when the magnet trips the reed switch can the motor run and operate the gearbox, and then rotate the cam 60. The mechanical latch 74 that retains the clasp pin is visible in figure 11b as a crescent shape inside the circular aperture.

Figure 12 is a perspective view from the front of the ski locking device of Figure 1, with the locking device in its open configuration. **Figure 12a** is a corresponding perspective view from the front of the snowboard locking device of Figure 1a, with the locking device in its open configuration.

Figures 12 and 12a provide a view of the sections of housings 12, 1012 that lie immediately under clasp 20 when clasp 20 is in the closed position. Also visible is equatorial groove 88. Groove 88 is of sufficient width to allow strap 22, 1022 to sit partly within it. This arrangement makes it more difficult to tamper with or remove strap 22 or 1022, when the locking device is closed. When the locking device is not in use, strap 22, 1022 may also lie in equatorial groove 88, ensuring that the locking deice takes up less storage volume.

Figure 13 is an exploded perspective view of the closure member for lengthwise adjustment of the retaining strap of the device, and the elements that attach the first end of the strap to the housing. Figure 13 uses the example of the strap 22 for the ski locking device 10. The features shown in figure 13 for strap 22 are equally applicable to the longer strap 1022 of the snowboard locking device 1010.

Closure member 20 is constructed in two parts 90 and 92. Parts 90 and 92 can be separated, as shown in the drawing of Figure 13, to enclose part of the distal end 94 of the flexible strap 22.

By referring to figures 2 and 2a, opening 24, into which the first end of straps 22 and 1022 pass, can be seen. Further details of the means for attaching the straps 22 and 1022 at both ends are visible in figure 13.

Strap 22 shown in figure 13 is provided with a core comprising a pair of steel or stainless steel cables 96. Cables 96 are terminated with respective ferrules 98 at either end of the strap. A cylindrical mounting rod 100 is disposed between the ferrules at the first end of the strap. The cylindrical mounting rod 100 secures the first end of the strap 22 or 1022 in the opening 24 provided in the half shell 12b or 1012b.

The inward facing surface of the strap is provided with a series of outwardly projecting ribs 27. Ribs 27 collectively give the inner surface of the strap 22 the appearance of a toothed belt, similar in appearance to that of an automotive drive belt. The outward facing surface 102 of strap 22 has a smooth rounded profile.

The co-operating parts 90 and 92 of the closure member are designed to clamp around the distal end 94 of the strap, to secure the strap to the closure member and the housing, using pin 116. The co-operating parts 90 and 92 are preferably cast aluminium components. The radially outward facing surface 104 of the inner part 92 is provided with a series of circumferentially spaced projections 106, see figure 13. The shape, size and pitch of projections 106 correspond to the ribs or teeth 27 on the inward facing surface of the strap. As a result, the distal end of the strap 94 can be selectively positioned along closure member 92, when adjusting the length of the flexible strap 22 or 1022 that is available to form the loop to hold the skis or snowboard tightly.

The radially inward facing surface of closure member 90, not shown in the drawing of Figure 13, is preferably of the same shape as that of the outer surface 102 of the flexible strap. As a result, when the parts 90 and 92 are joined together and locked with pin 116, the distal end 94 of strap 22 is securely clamped between the two parts 90 and 92 and held captive therein, with the two parts 90 and 92 securely fixed together.

In use, holes 118 in strap 22 allow the length of the strap 22 between the first end and closure member 20 to be adjusted. This adjustment can be set such that the strap 22 is

moderately tensioned around the skis passing through the loop that is created by the closed strap. Pin 116 passes through the selected hole.

Figure 14 shows the ski locking device in typical use, to lock together a pair of skis and ski poles. Ski poles 120 have been inserted into the parallel slots 16 of hand portable ski locking device 10. Similarly, skis 122 lie in the recess 28 of the ski locking device 10. Strap 22 is wrapped around the outside of the ski locking device, poles and skis. Strap 22 has been adjusted to provide a loop of a suitable length, retaining skis 122 located in the recess and ski poles 120.

In order to achieve the configuration shown in Figure 14, a user may follow steps (i)-(iv) below, although steps (i) and (ii) may be performed in the opposite order to that shown:

(i) inserting ski poles 120 into the slots 16 (shown in figure 1) of the housing 12 of the ski locking device 10;

(ii) inserting skis 122, arranged with their slide surfaces in abutting relationship, into recess 28 (shown in figure 2) of the housing 12 of ski locking device 10;

(iii) arranging a loop of flexible strap 22 around the housing 12, with the first end of strap 22 being connected to the housing 12;

(iv) locking strap 22 to the housing 12 with lockable closure member 20;

whereby, when the closure member 20 is locked, strap 22 forms a loop of suitable length for retaining skis 122 located in the recess 28 and retaining the pair of ski poles 120 in the slots 16.

Figure 14a shows the snowboard locking device 1010 in typical use, to lock a snowboard. A snowboard 1124 lies in the recess of the ski locking device 1010. Strap 1022 is wrapped around the outside of the ski locking device and the snowboard 1124. Strap 1022 has been adjusted to provide a loop of a suitable length, retaining snowboard 1124 located in the recess.

In order to achieve the configuration shown in Figure 14a, a user may follow steps (i)-(iv) below:

(i) inserting the edge of the snowboard 1124 into the recess 1028 in the housing 1012 of the snowboard locking device 1010;

(ii) arranging the loop of the flexible strap 1022 around the housing 1012, the first end of the strap 1022 being connected to the housing 1012;

(iii) locking the strap 1022 to the housing 1012 with the lockable closure member 20;

whereby, when the closure member 20 is locked, the strap 1022 forms a loop for retaining a snowboard 1124 located in the recess 1028.

The features and steps of the above embodiments are illustrative only, and variations are possible. The invention is defined in the appended claims.

Claims

1. A ski locking device (10) for securing a pair of snow skis (122) and/or ski poles (120), the ski locking device comprising:

a housing (12) having at least one opening (16) for receiving a pair of ski poles and a recess (28) for receiving at least part of a pair of skis arranged with their slide surfaces in abutting relationship;

a flexible strap (22), a first end of the strap being connected to the housing (12);

a lockable closure member (20), for locking the strap (22) to the housing (12);

whereby, when the closure member (20) is locked, the strap (22) forms a loop for retaining skis located in the recess (28) and/or retaining the pair of ski poles in the at least one opening (16).

2. A ski locking device (10) as claimed in claim 1, wherein:
the at least one opening (16) and the recess (28) are located on opposite sides of the housing (12).

3. A ski locking device (10) as claimed in claim 1 or claim 2, wherein:
a pair of openings (16) is provided, each for receiving a respective ski pole (120).

4. A ski locking device (10) as claimed in claim 3, wherein:
the openings (16) are arranged in side-by-side spaced apart relation, with said recess (28) located in a plane (14) intermediate the openings.

5. A ski locking device (10) as claimed in any preceding claim, wherein:
in its closed position, the closure member (20) is locked to the side of the housing (12) and retains the strap (22), the strap (22) lying around the housing, outside the at least one opening (16) and the recess (28).

6. A ski locking device (10) as claimed in any preceding claim, wherein:
the length of the strap (22) is adjustable to accommodate different size skis (122) in the loop.

7. A ski locking device (10) as claimed in any preceding claim, wherein:
the strap (22) passes through the closure member (20) and is locked to the closure member and the housing (12) when the closure member is locked; and
the length of the strap (22) is adjustable by sliding the strap through the closure member (20), prior to locking.

8. A ski locking device (10) as claimed in any of claims 5-7, wherein:
the strap (22) includes a series of surface projections (27) on one side thereof;
the surface projections on the strap engage corresponding projections (106) on an interior surface of the closure member (20) and/or engage with the edges of skis (122) lying within the loop.

9. A ski locking device (10) as claimed in any of claims 5-8, wherein:
the strap (22) comprises a series of holes (118);
the closure member (20) is removably attachable to the side of the housing (12), using a clasp pin (116); and
the clasp pin (116) passes through a selected hole (118) in the strap (22), thereby locking the strap (22) to the closure member (20) and the housing (12) when the closure member (20) is locked, and fixing the length of the loop.

10. A ski locking device (10) as claimed in any previous claim, wherein:
the closure member (20) is electrically or electronically locked to the housing (12) by means of an electronic locking means (70, 74) located within the housing.

11. A ski locking device (10) as claimed in claim 10, wherein:
the locking means (74) is releasable by means of a unique electronic id key.

12. A ski locking device (10) as claimed in Claim 11, wherein:

the locking means (74) is releasable by means of a contact or contactless electronic key having a unique electronic id address, for example a key which conforms to an electronic communications protocol such as 1-Wire or the like.

13. A ski locking device (10) as claimed in any preceding claim, further comprising:

a cable lock (44, 48) for locking the device to an external fixture, the cable lock including a reel (44) within the housing.

14. A ski locking device as claimed in claim 13, wherein:

the end (48) of the cable can be secured in a recess (114) in the housing (12), by the closure member (20).

15. A ski locking device as claimed in any preceding claim, wherein:

the housing (12) is generally ovoid.

16. A ski locking device (10) as claimed in any preceding claim, wherein:

the strap (22) comprises two or more cut-resistant cables (96), overmoulded with a grade of thermoplastic elastomer (102).

17. A ski locking device (10) as claimed in any preceding claim, wherein:

at least the outer surface of the strap (22) is silicone.

18. A method of securing a pair of snow skis (122) and/or ski poles (120), the method comprising:

inserting a pair of ski poles (120) into at least one opening (16) in a housing (12) of a ski locking device (10);

inserting a pair of skis (122), arranged with their slide surfaces in abutting relationship, into a recess (28) in the housing (12);

arranging a loop of a flexible strap (22) around the housing (12), a first end of the strap (22) being connected to the housing (12);

locking the strap (22) to the housing (12) with a lockable closure member (20);

whereby, when the closure member (20) is locked, the strap (22) forms a loop for retaining skis (122) located in the recess (28) and/or retaining the pair of ski poles (120) in the at least one opening (16).

19. A snowboard locking device (1010) for securing a snowboard (1124), the snowboard locking device comprising:

a housing (1012) having a recess (1028) for receiving a snowboard (1124);

a flexible strap (1022), a first end of the strap being connected to the housing (1012);

a lockable closure member (20), for locking the strap (1022) to the housing (1012);

whereby, when the closure member (20) is locked, the strap (1022) forms a loop for retaining a snowboard (1124) located in the recess (1028).

20. A snowboard locking device (1010) in accordance with claim 19, wherein:
in its closed position, the closure member (20) is locked to the side of the housing (1012) and retains the strap (1022), the strap (1022) lying around the housing, outside the recess (1028).

21. A snowboard locking device (1010) in accordance with claim 19 or claim 20, wherein the length of the strap (1022) is adjustable to accommodate different size snowboards (1124) in the loop.

22. A snowboard locking device (1010) in accordance with any of claims 19-21, wherein the strap (1022) passes through the closure member (20) and is locked to the closure member and the housing (1012) when the closure member is locked; and
the length of the strap (1022) is adjustable by sliding the strap through the closure member (1020), prior to locking.

23. A snowboard locking device (1010) in accordance with any of claims 19-22, wherein the strap (1022) includes a series of surface projections (27) on one side thereof; and
the surface projections on the strap engage corresponding projections (106) on an interior surface of the closure member (20) and/or engage with the edge of a snowboard (1124) lying within the loop.

24. A snowboard locking device (1010) in accordance with any of claims 19-23 wherein:
the strap (1022) comprises a series of holes (118);
the closure member (20) is removably attachable to the side of the housing (1012), using a clasp pin (116); and
the clasp pin (116) passes through a selected hole (118) in the strap (1022), thereby locking the strap (1022) to the closure member (20) and the housing (1012) when the closure member (20) is locked, and fixing the length of the loop.

25. A snowboard locking device (1010) in accordance with any of claims 19-24, wherein the closure member (20) is electrically or electronically locked to the housing (1012) by means of an electronic locking means (70, 74) located within the housing.

26. A snowboard locking device (1010) in accordance with any of claims 19-25, wherein the locking means (74) is releasable by means of a unique electronic id key.

27. A snowboard locking device (1010) in accordance with any of claims 19-26, wherein the locking means (74) is releasable by means of a contact or contactless electronic key having a unique electronic id address, for example a key which conforms to an electronic communications protocol such as 1-Wire or the like.

28. A snowboard locking device (1010) in accordance with any of claims 19-27, further comprising a cable lock (44, 48) for locking the device to an external fixture, the cable lock including a reel (44) within the housing (1012).

29. A snowboard locking device (1010) in accordance with any of claims 19-28, wherein the end (48) of the cable can be secured in a recess (114) in the housing (1012), by the closure member (20).

30. A snowboard locking device (1010) in accordance with any of claims 19-29, wherein the strap (22) comprises two or more cut-resistant cables (96), overmoulded with a grade of thermoplastic elastomer (102).

31. A snowboard locking device (1010) in accordance with any of claims 19-30, wherein at least the outer surface of the strap (22) is silicone.

32. A method of securing a snowboard (1124), the method comprising:

inserting the edge of a snowboard (1124) into a recess (1028) in the housing (1012) of a snowboard locking device (1010);

arranging a loop of a flexible strap (1022) around the housing (1012), a first end of the strap (1022) being connected to the housing (1012);

locking the strap (1022) to the housing (1012) with a lockable closure member (20);

whereby, when the closure member (20) is locked, the strap (1022) forms a loop for retaining a snowboard (1124) located in the recess (1028).

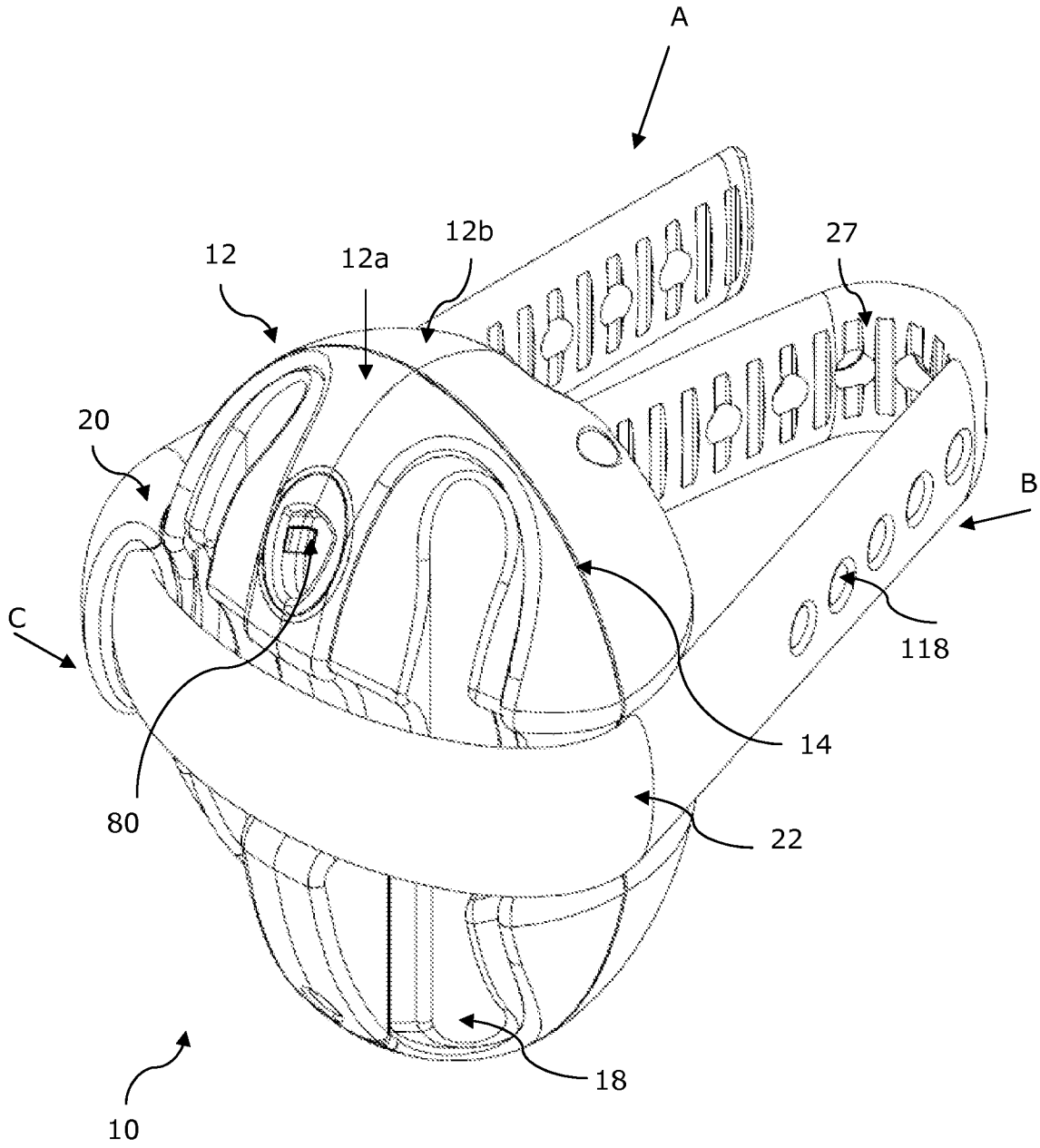

Figure 1

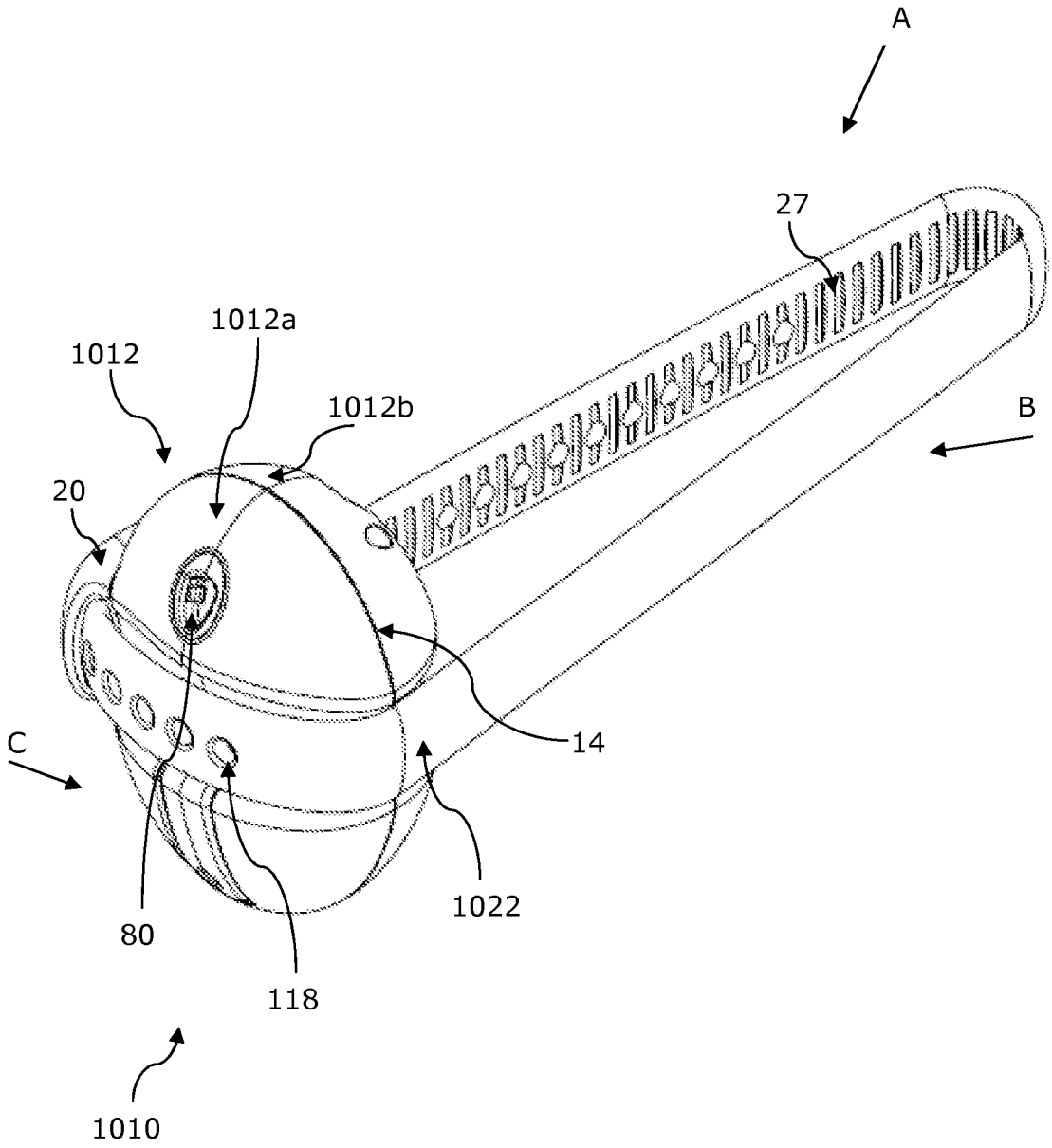

Figure 1a

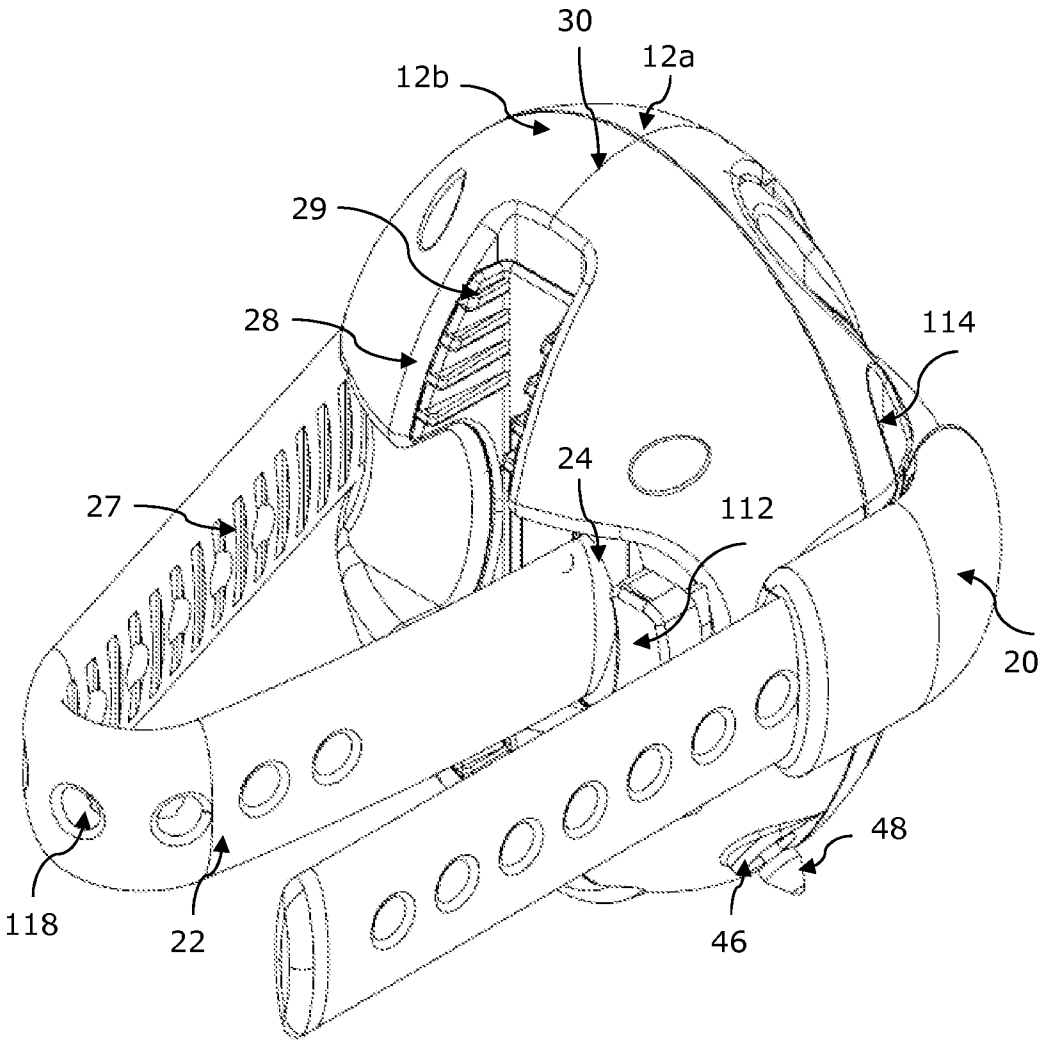

Figure 2

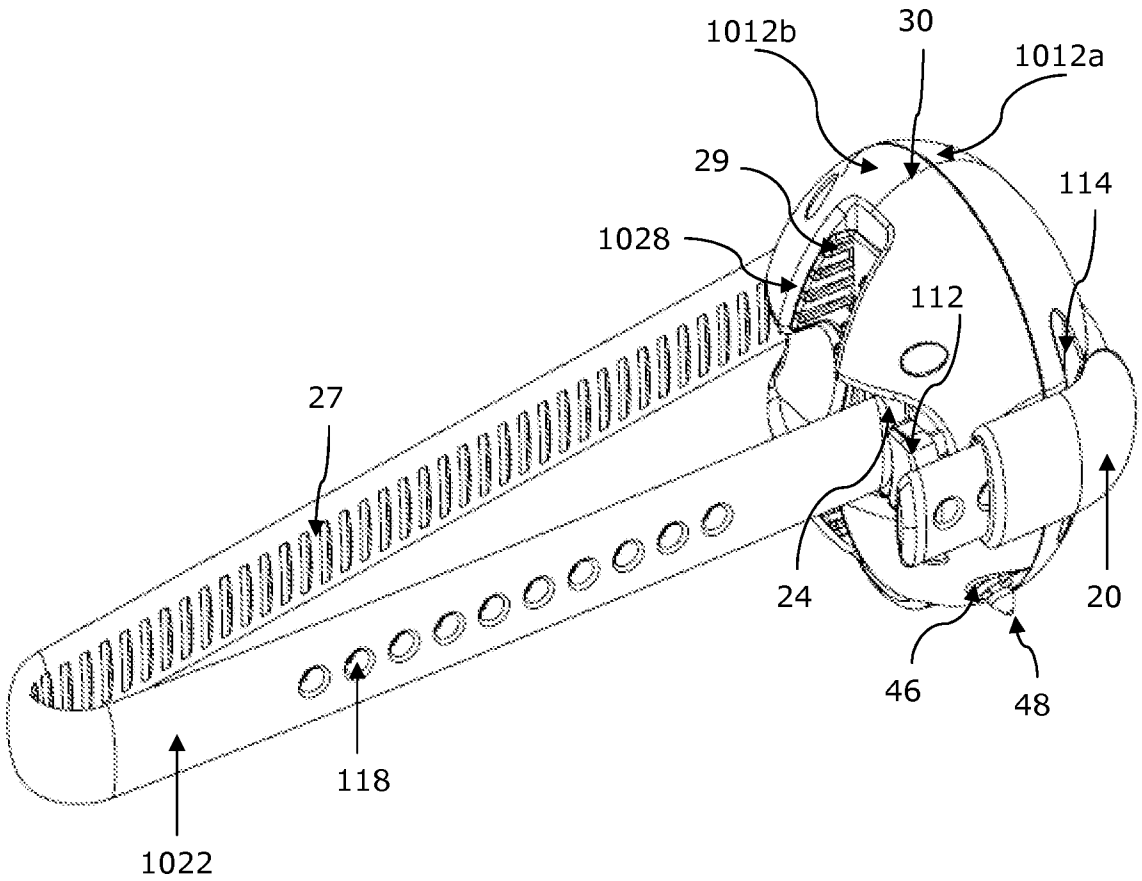

Figure 2a

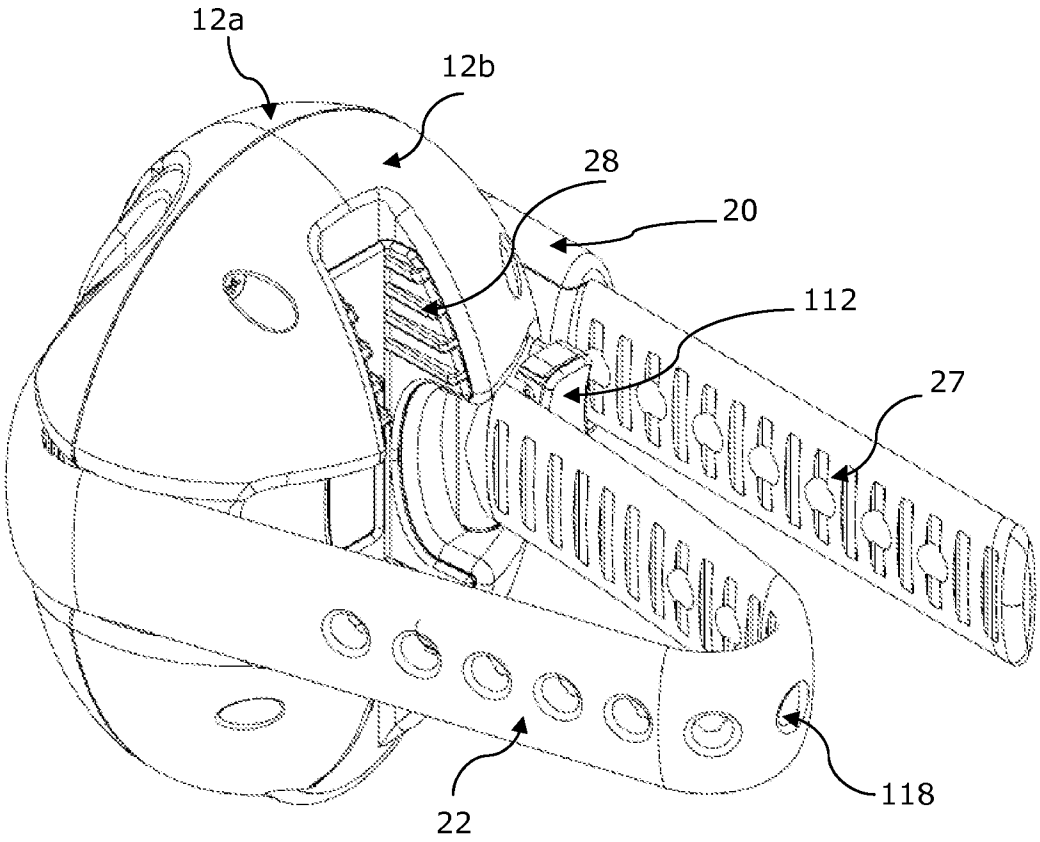

Figure 3

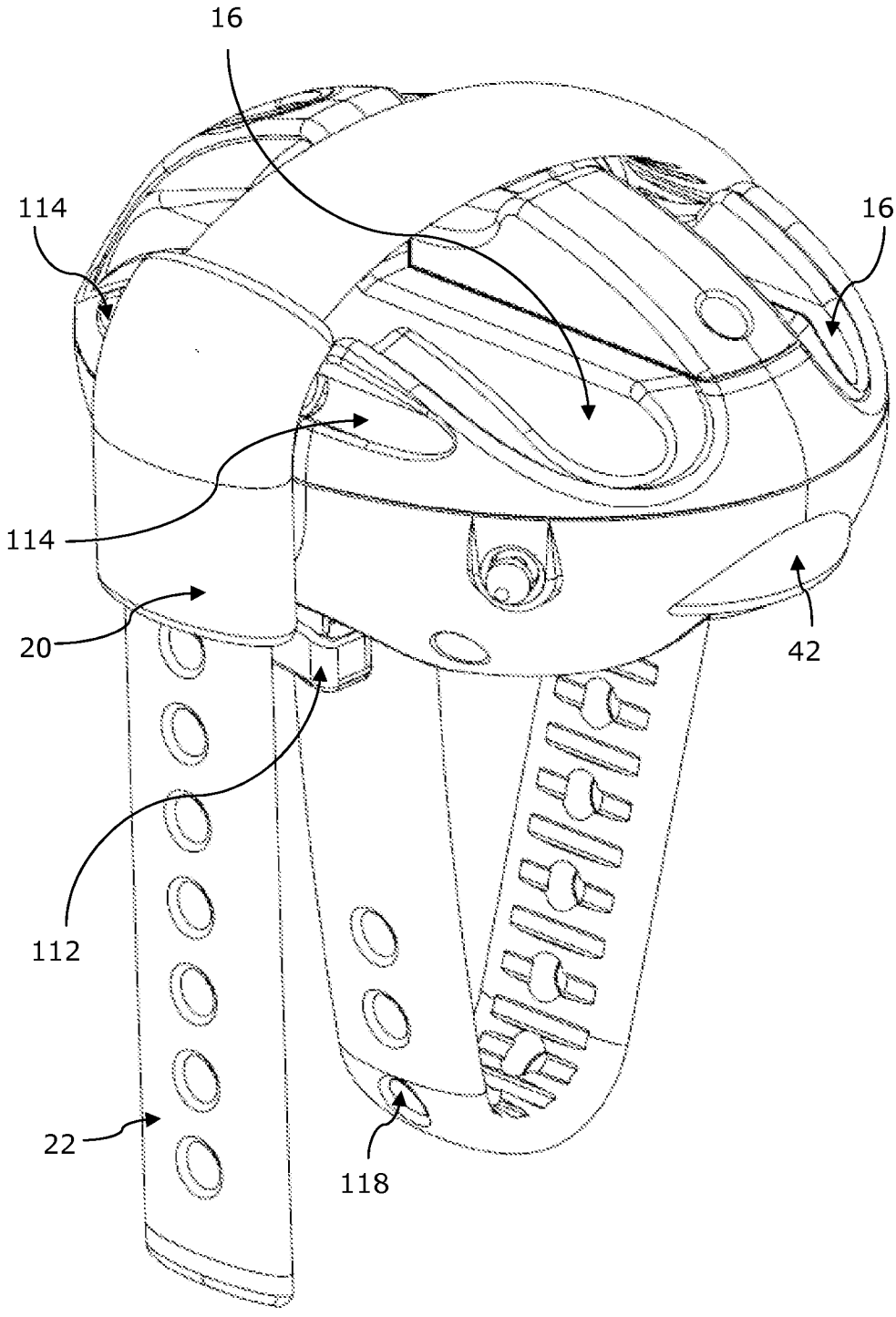

Figure 4

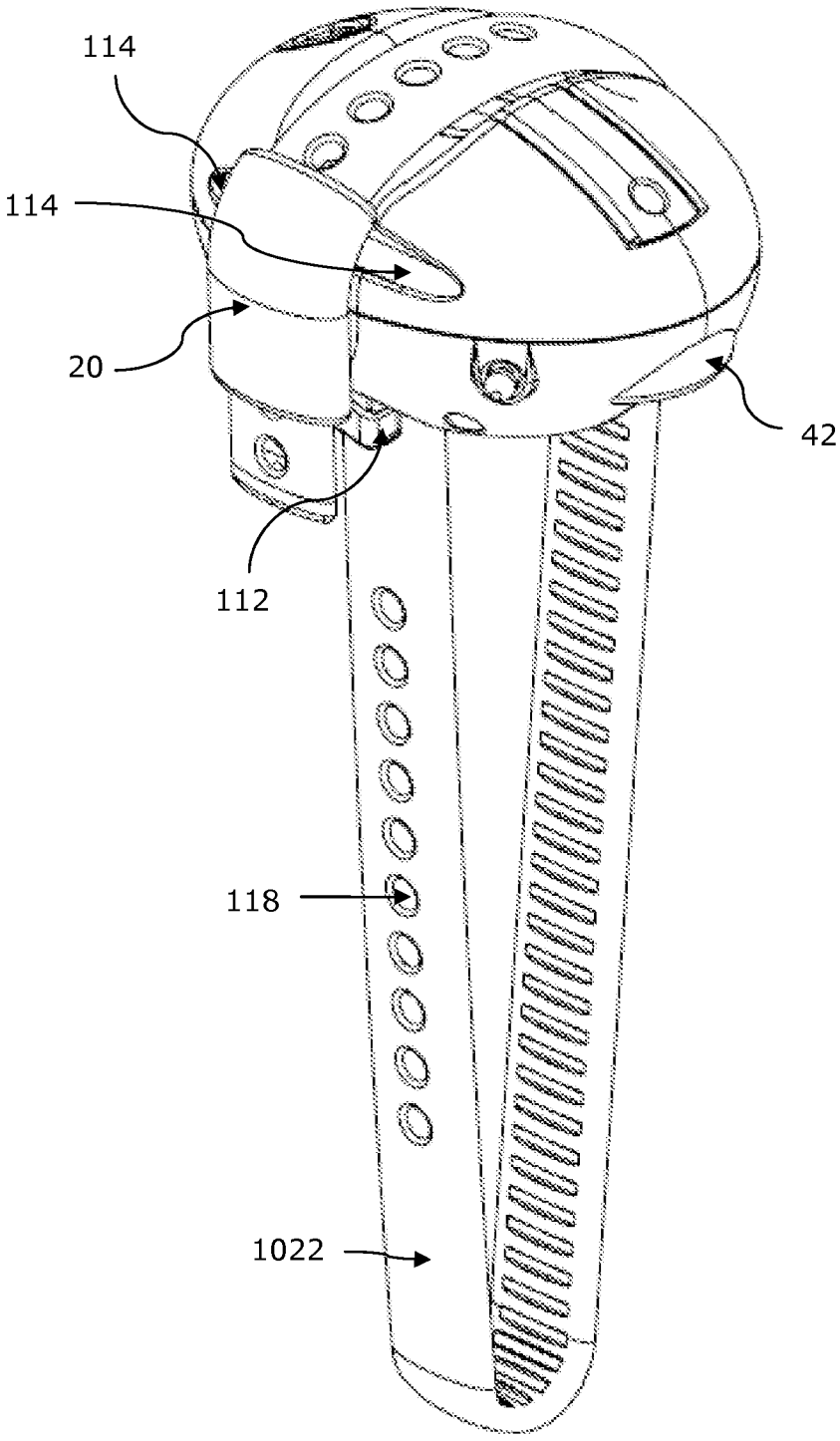

Figure 4a

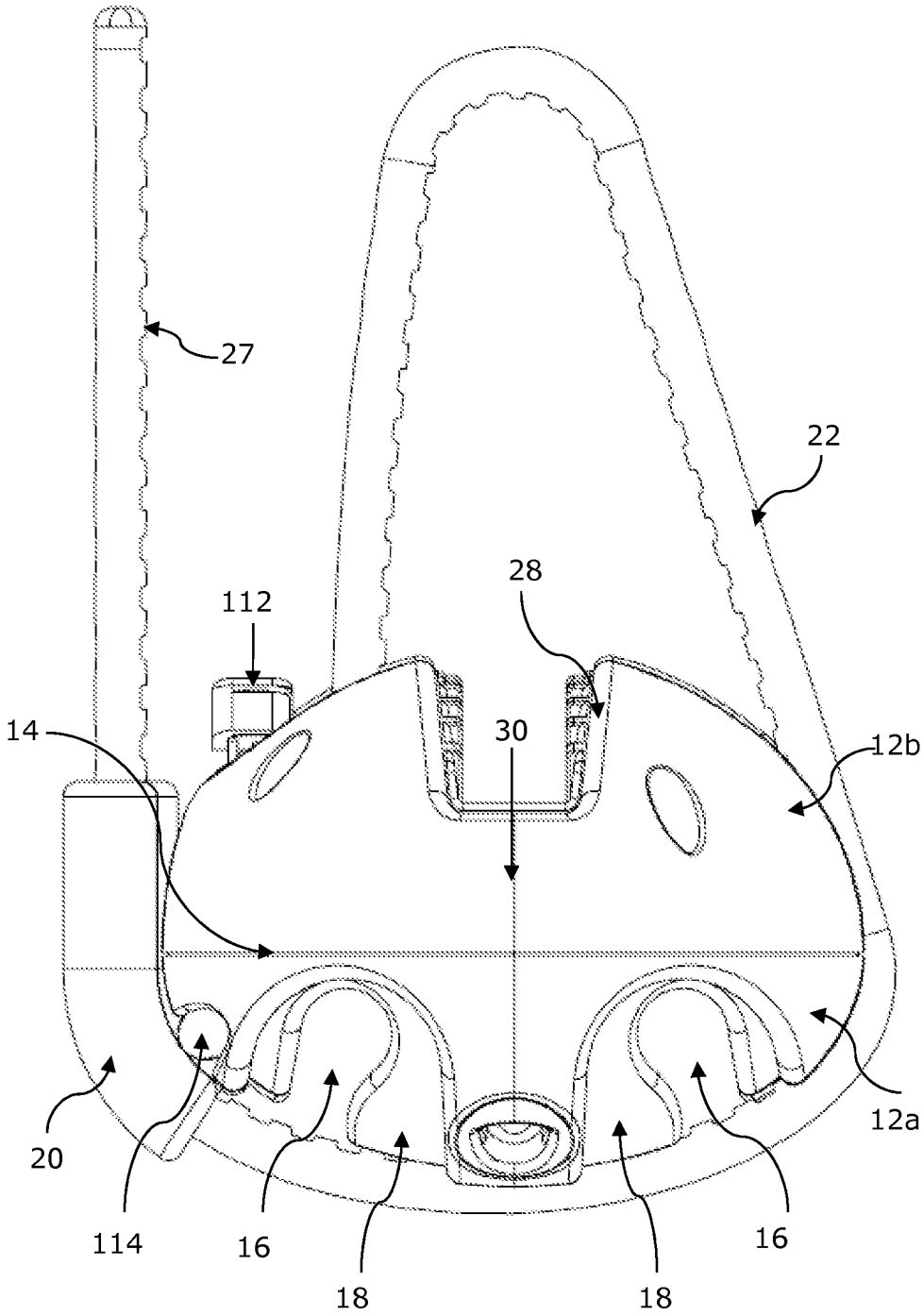

Figure 5

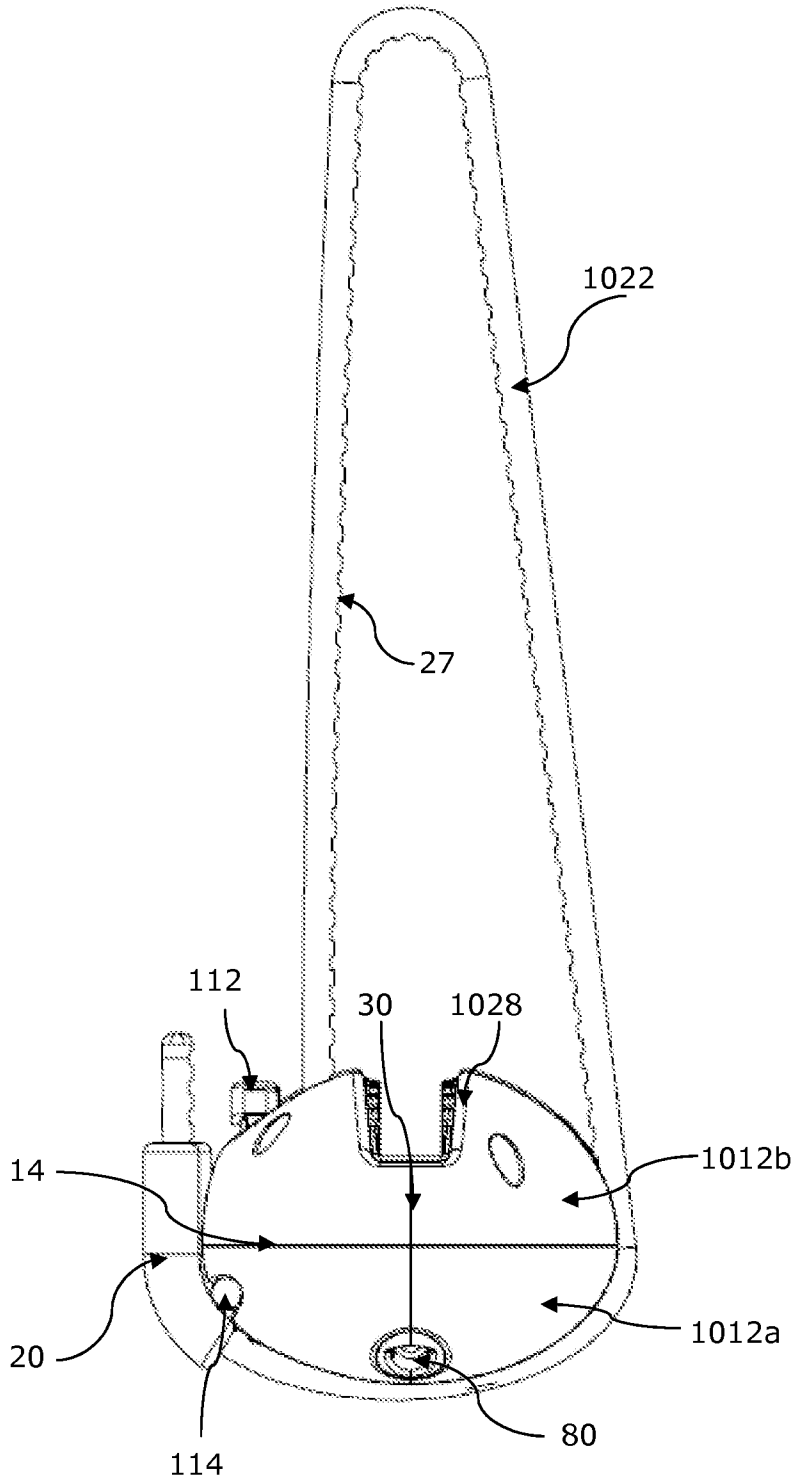

Figure 5a

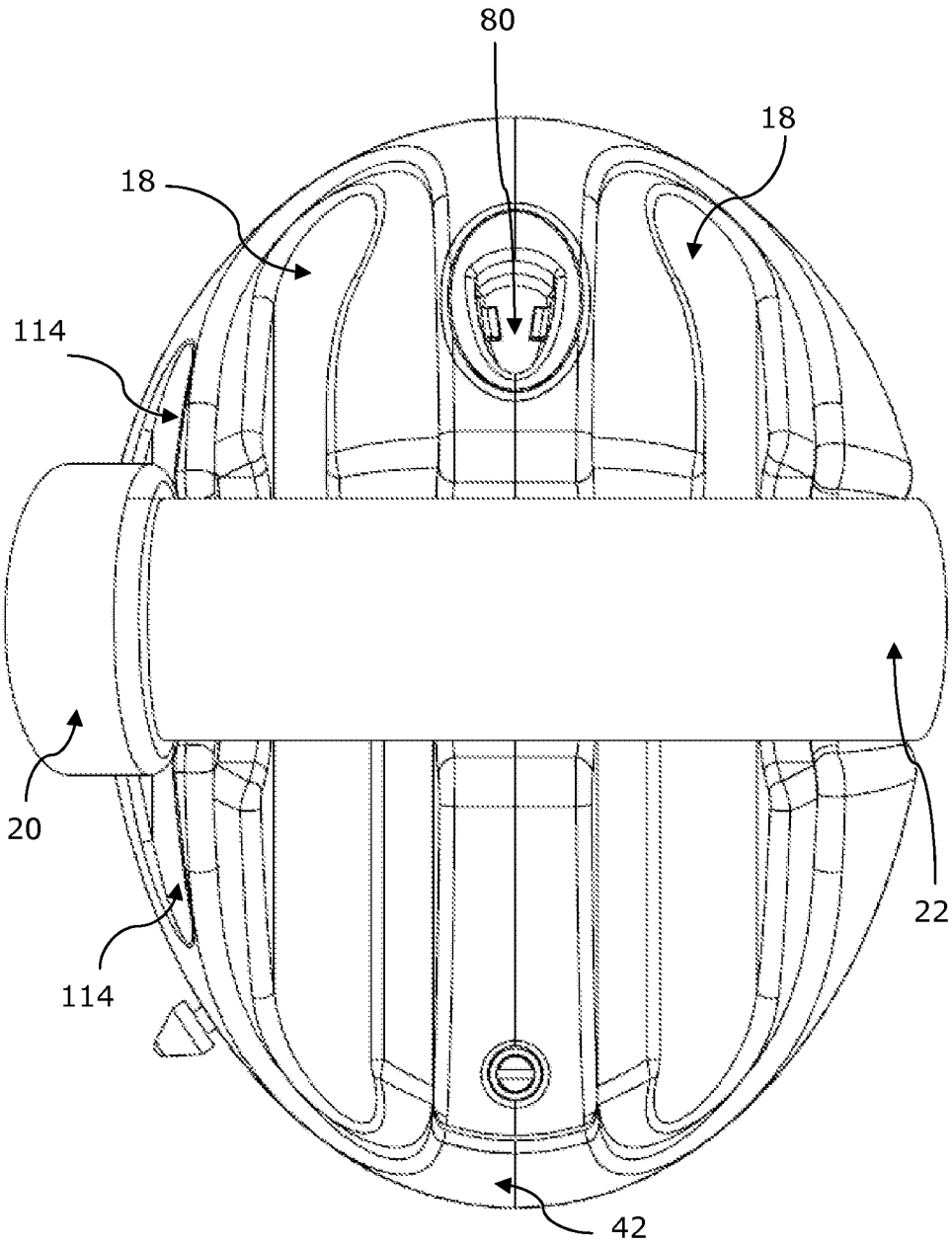

Figure 6

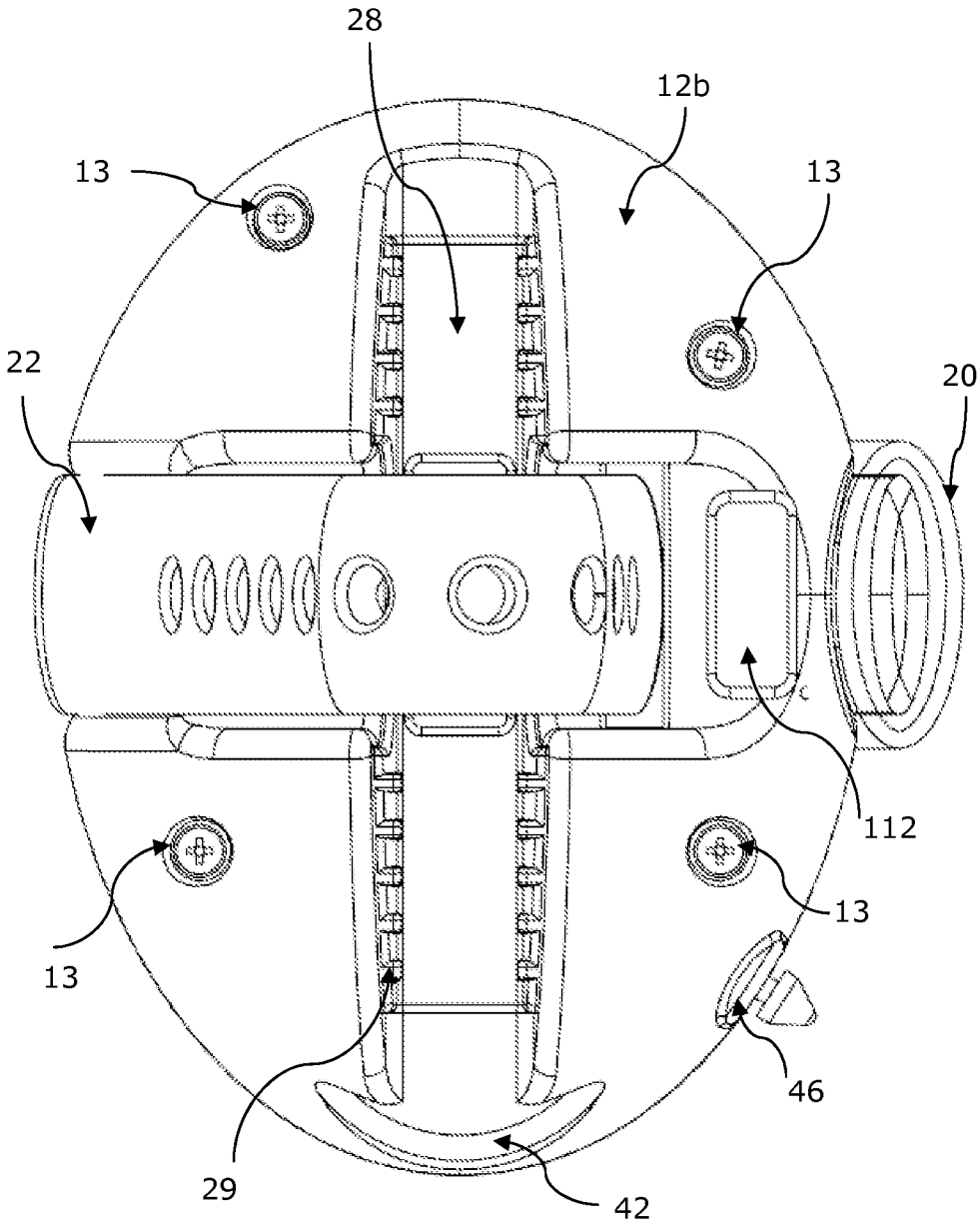

Figure 7

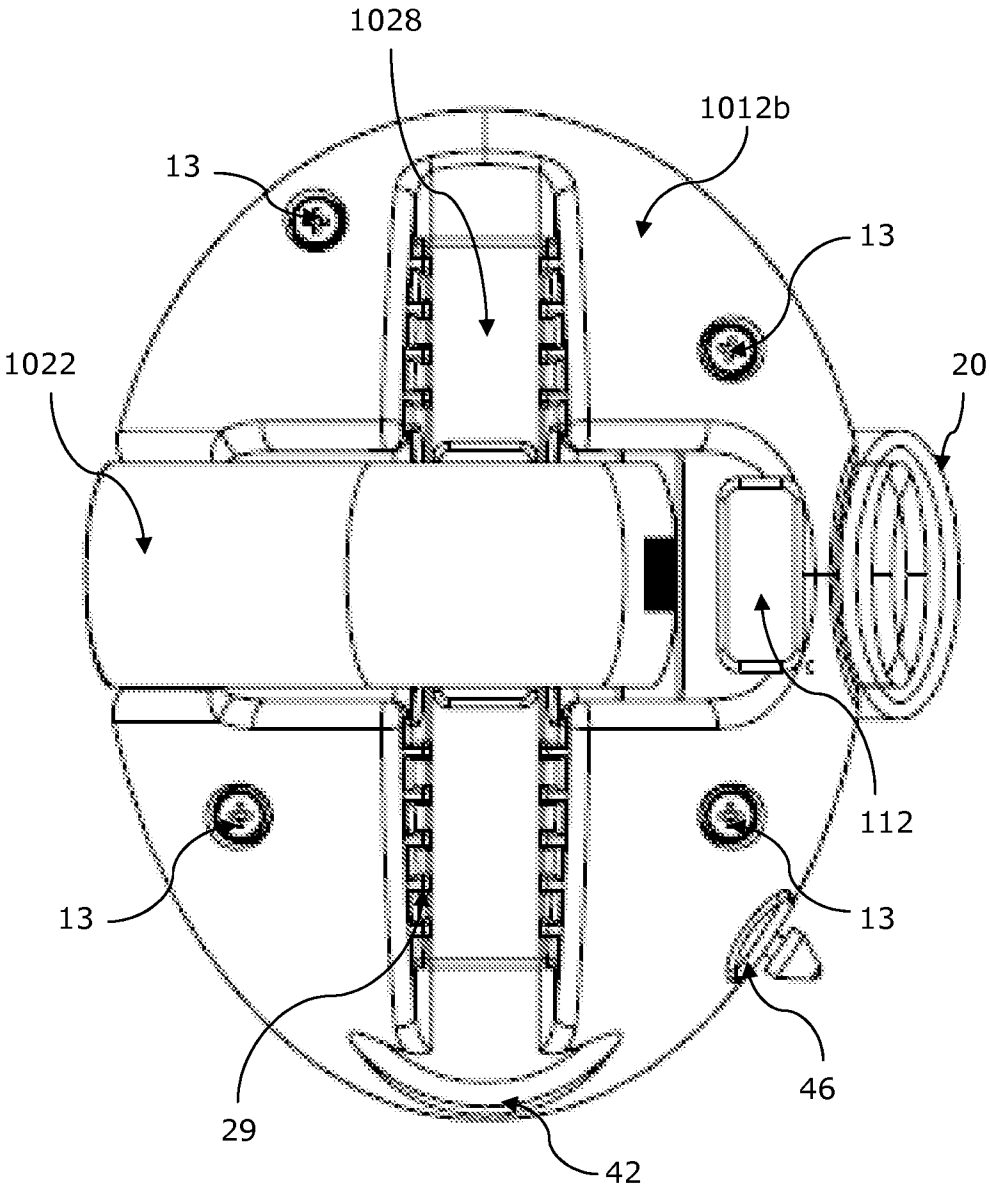

Figure 7a

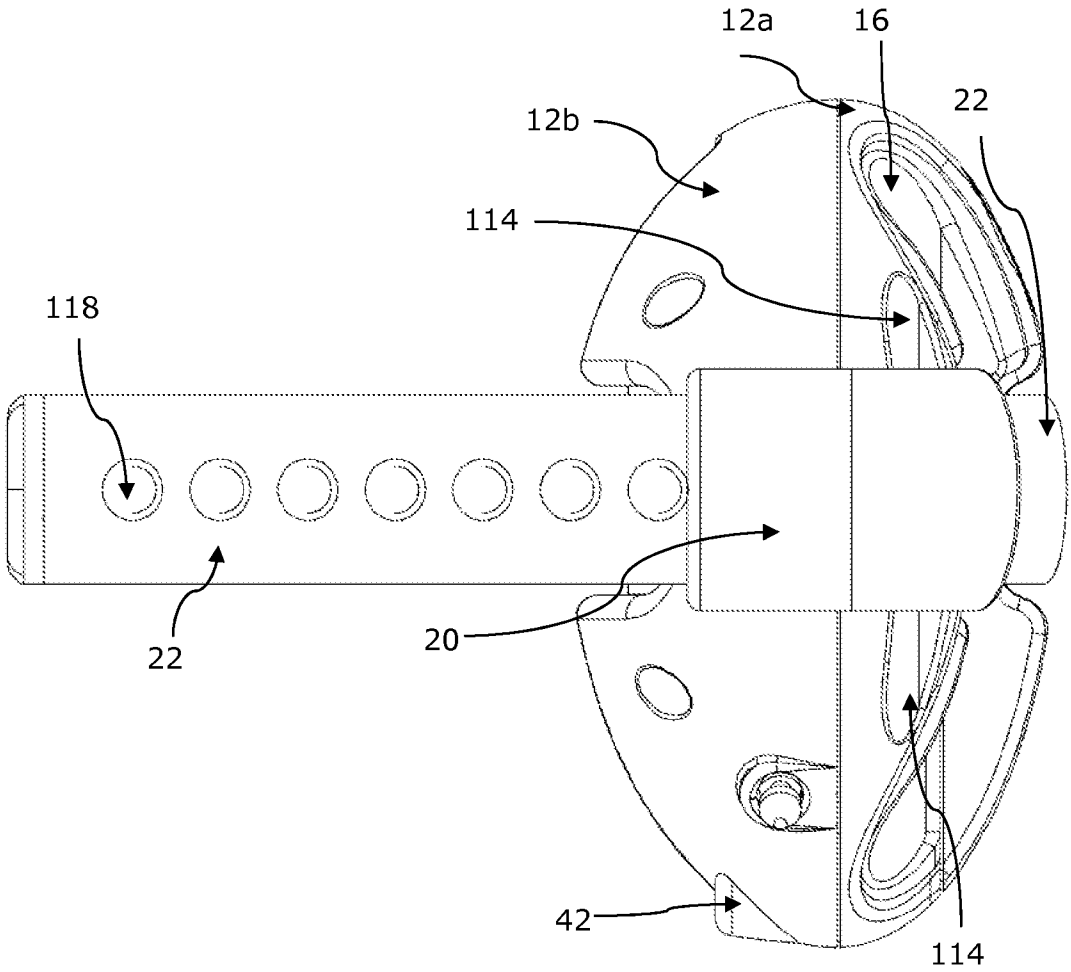

Figure 8

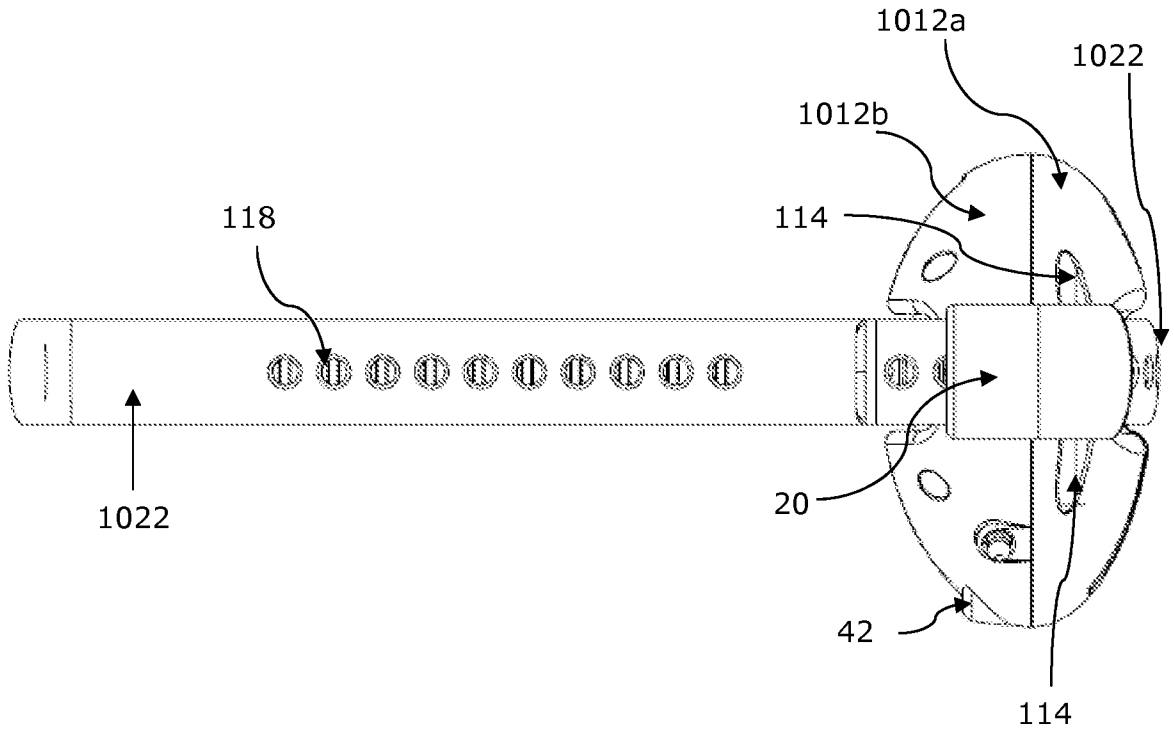

Figure 8a

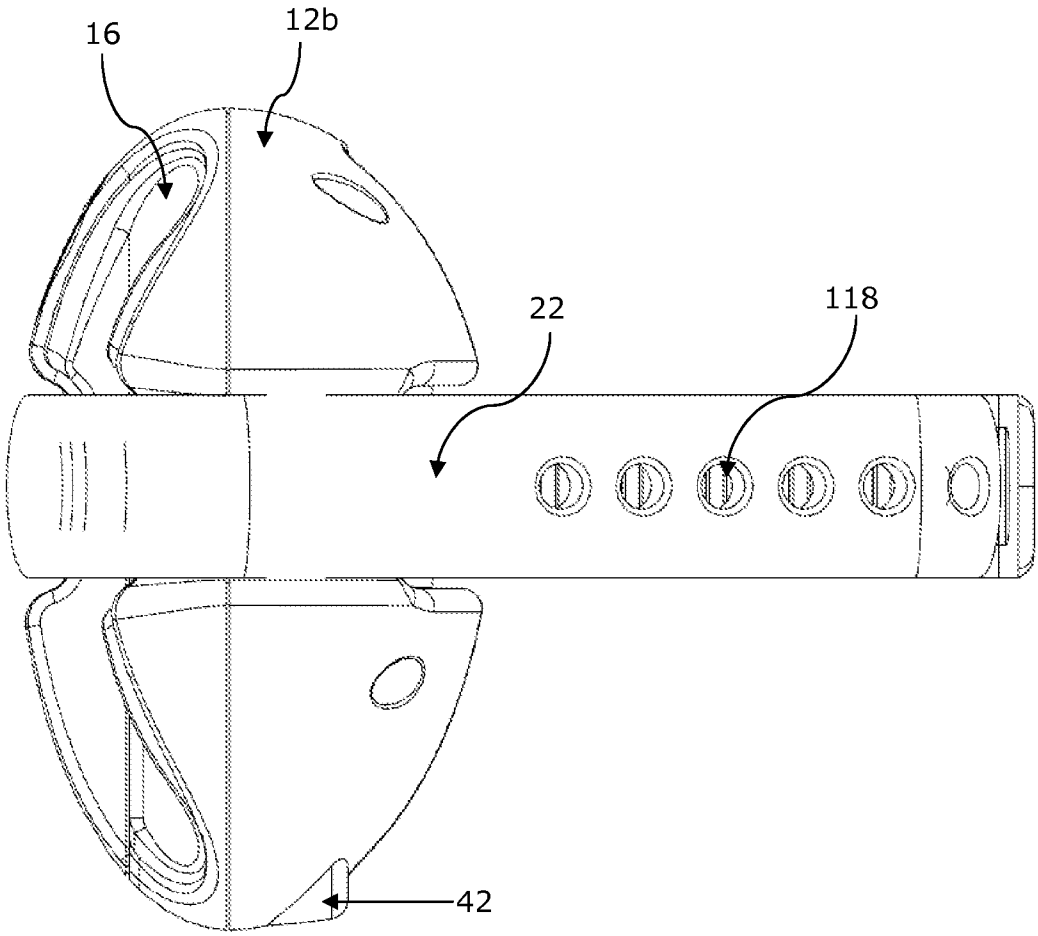

Figure 9

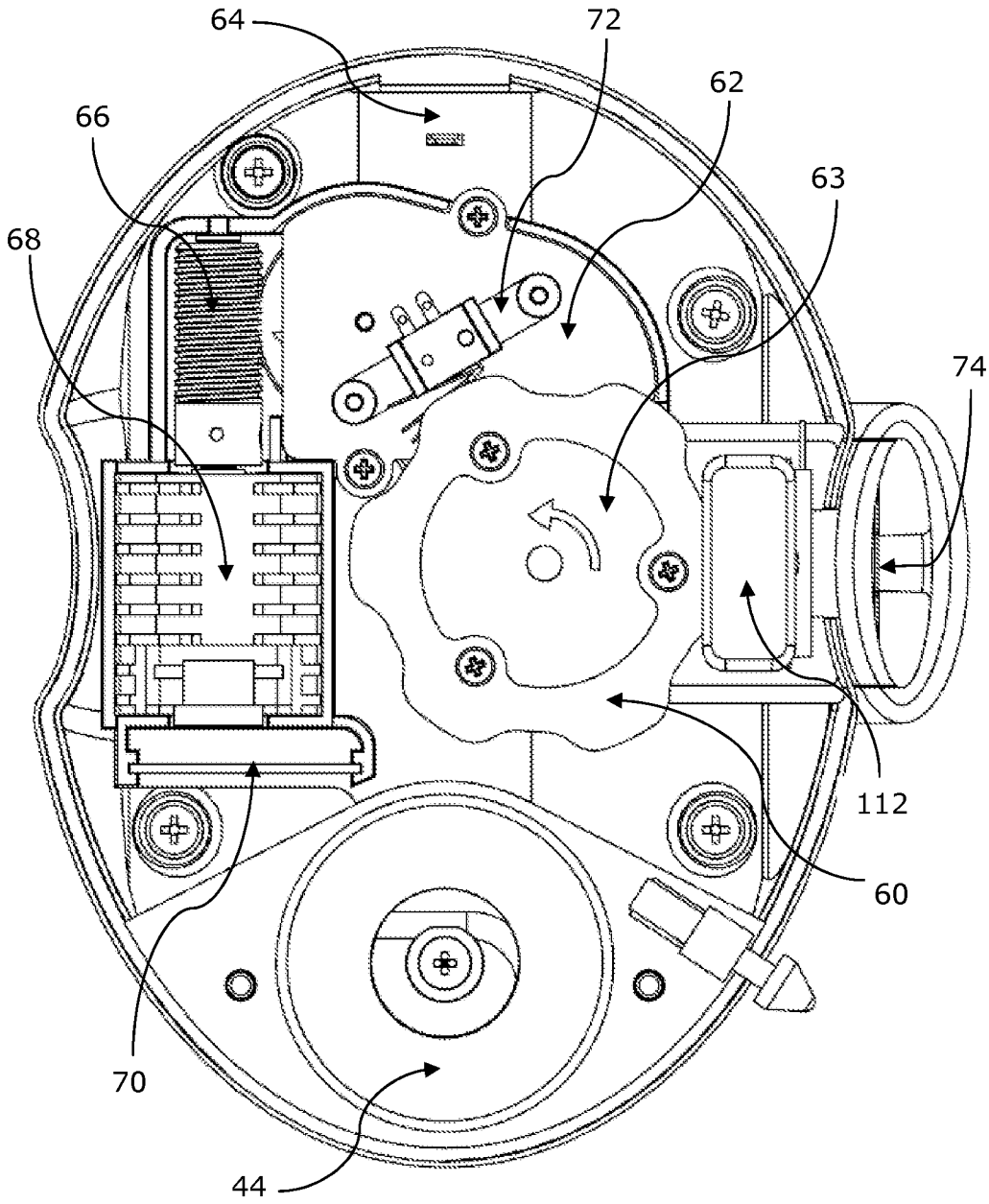

Figure 10

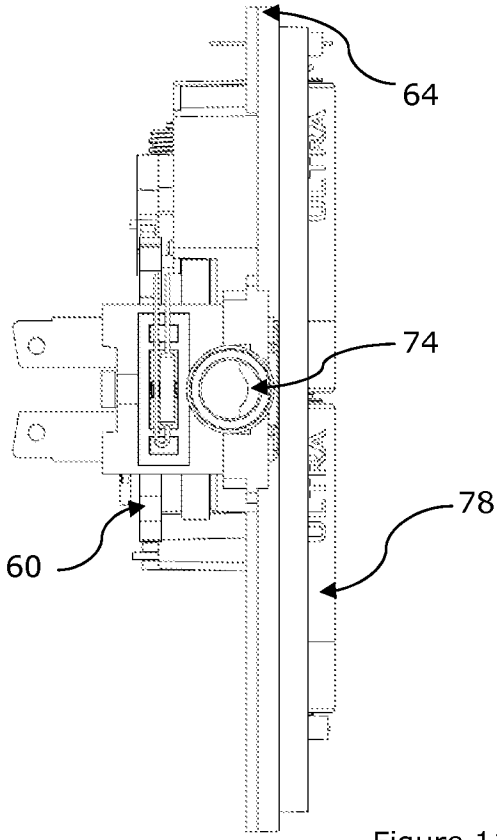

Figure 11b

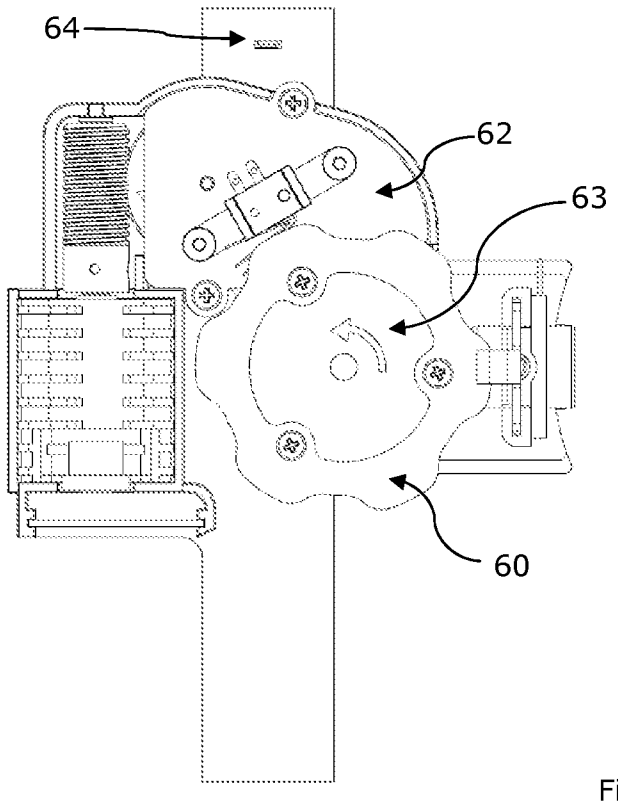

Figure 11a

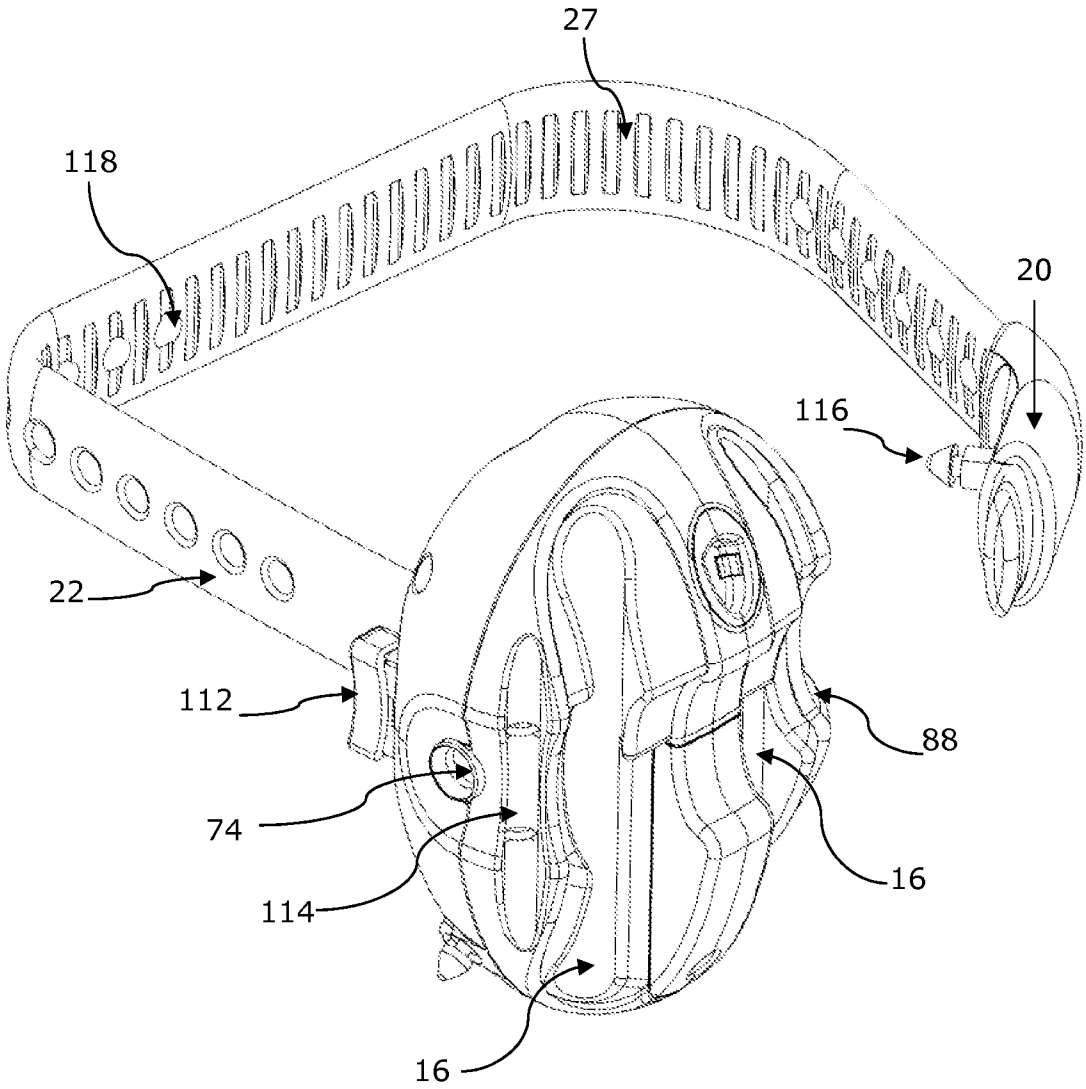

Figure 12

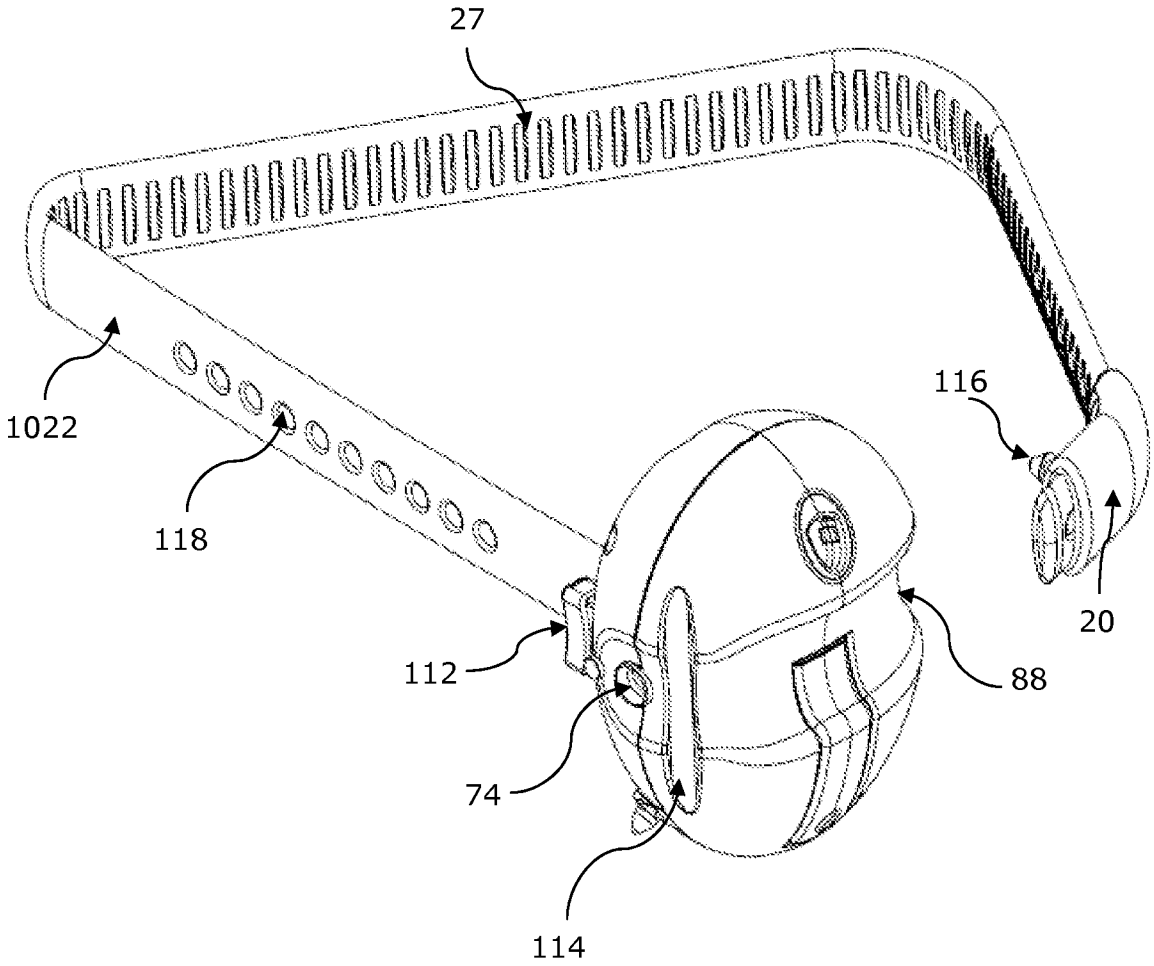

Figure 12a

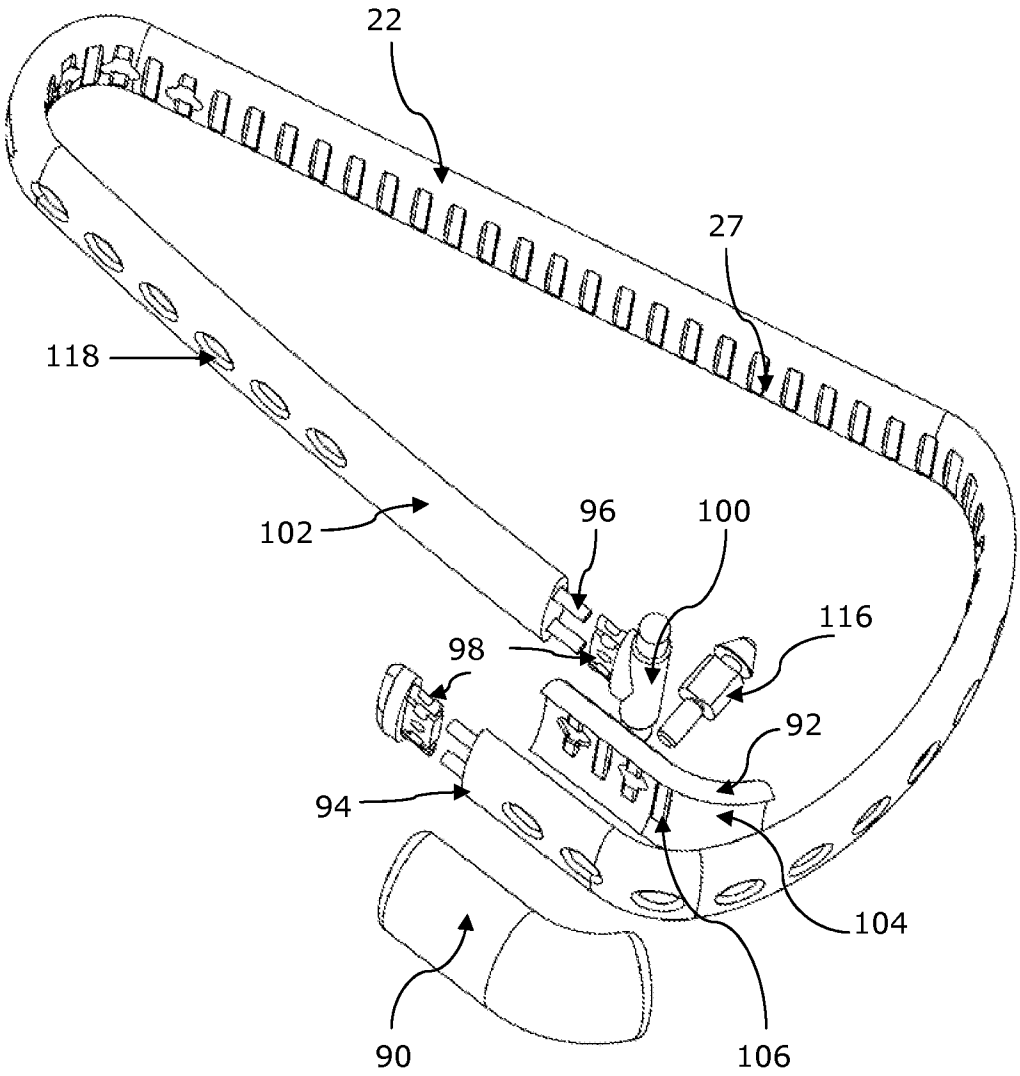

Figure 13

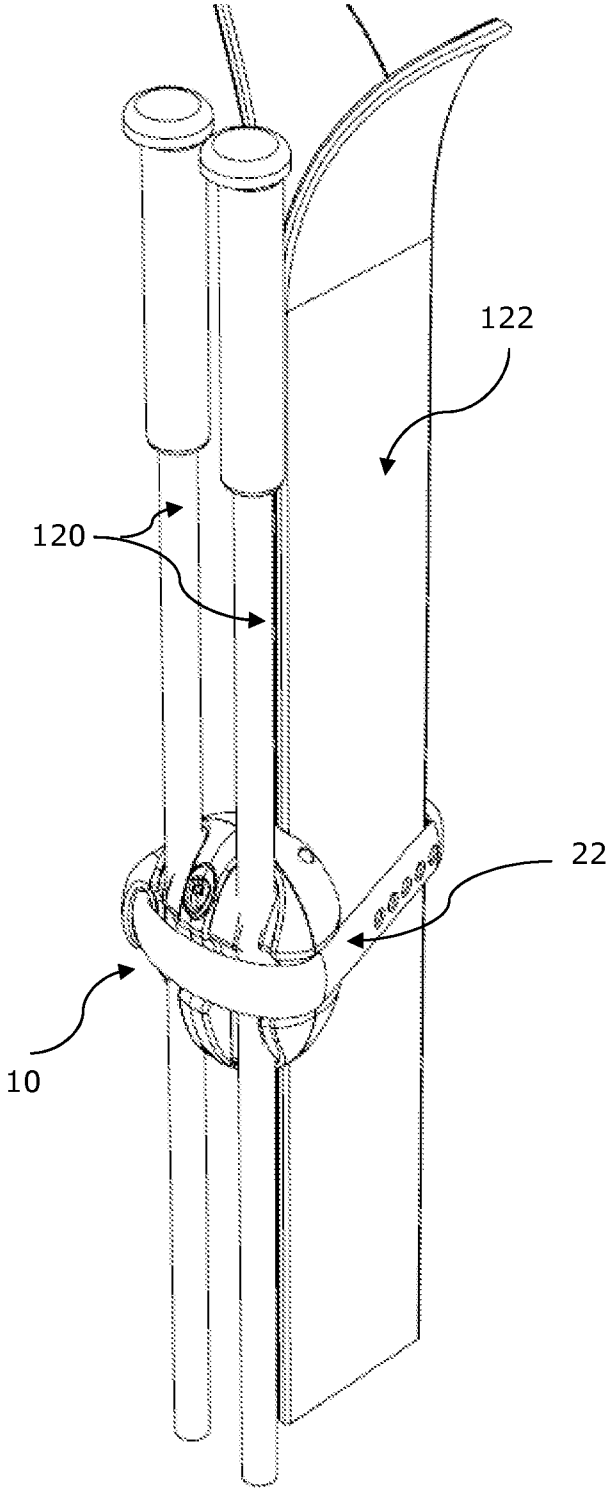

Figure 14

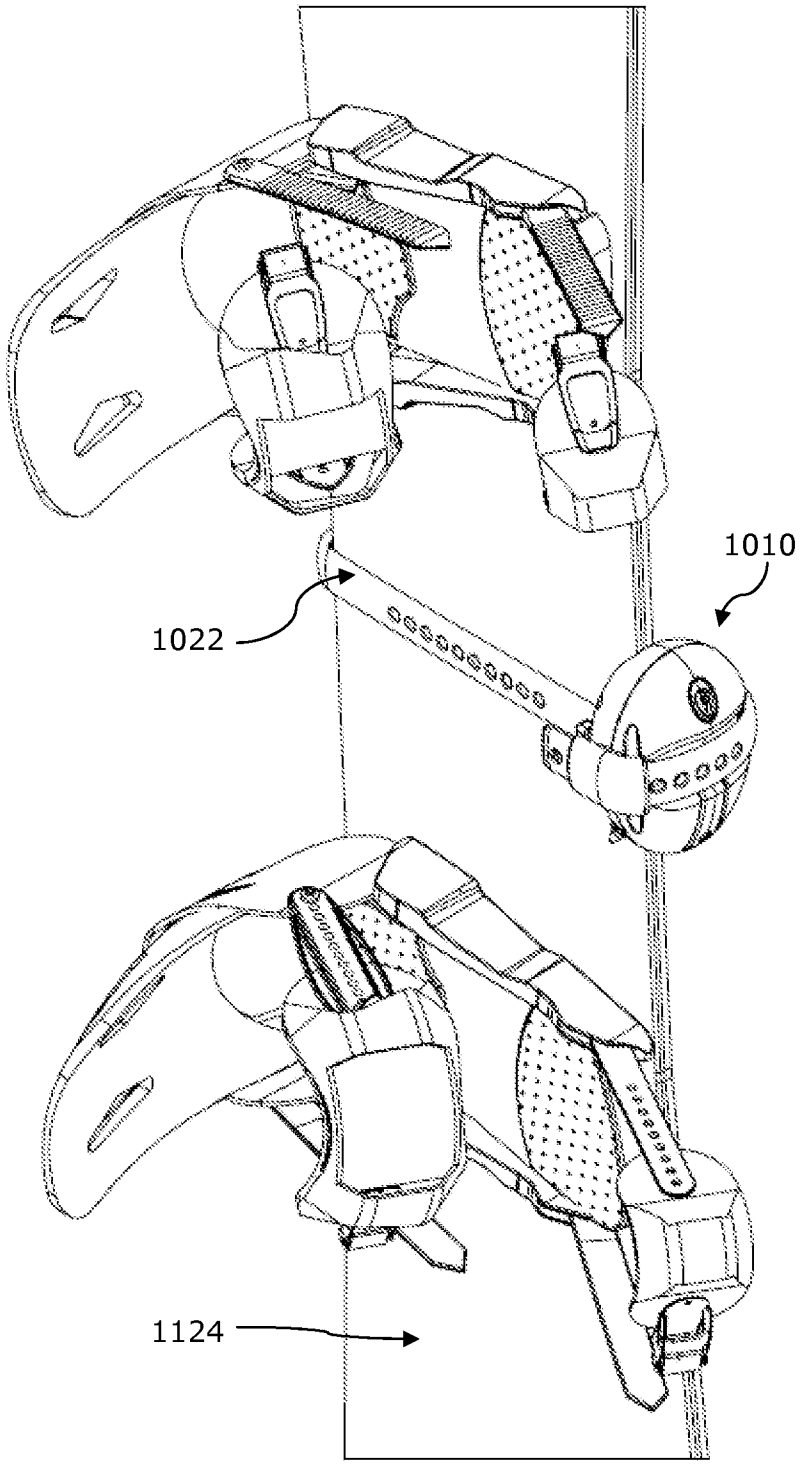

Figure 14a

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2011/051217

A. CLASSIFICATION OF SUBJECT MATTER
INV. A63C11/00 A63C11/02 E05B67/00
ADD.

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)
A63C E05B

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 practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 985 275 A (ALLEN RICHARD MICHAEL) 12 October 1976 (1976-10-12) figure 2	1-32
A	US 6 470 718 B1 (YANG KUO-TSUNG [TW]) 29 October 2002 (2002-10-29) the whole document	1-32
A	US 3 838 585 A (FOOTE D) 1 October 1974 (1974-10-01) column 2 - column 4; figure 1	1-32

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
11 May 2011	25/05/2011

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Haller, E

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2011/051217

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 3985275 A	12-10-1976	NONE	
US 6470718 B1	29-10-2002	DE 10205650 C1	14-08-2003
US 3838585 A	01-10-1974	NONE	