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(54) **Fastening device suitable for use with needle detectors**

(57) A fastening device (20) designed to be suitably used with needle detectors. The fastening device (20) does not trigger alarms from needle detectors. The fastening device (20) comprises a frame having a plurality of metallic strips (22, 26) coupled contiguously to form an enclosure. The plurality of metallic strips (22, 26) are selected from a group of metallic materials having differ-

ent ferromagnetic responses and at least two of said selected metallic strips have different ferromagnetic responses. Thereby when said fastening device (20) is attached to a garment and said garment is passed through a needle detector, said fastening device (20) does not trigger a false alarm from said needle detector. A tongue (30) is further attached to one of the metallic strips (26).

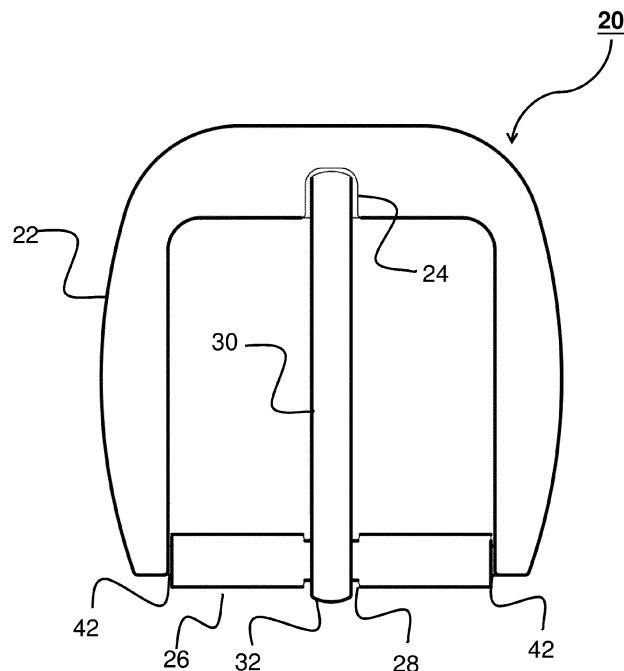


Fig.1

Description

FIELD OF INVENTION

[0001] This invention relates to a fastening device suitable for use with needle detectors, and in particular, a fastening device that does not trigger alarms from needle detectors.

BACKGROUND OF INVENTION

[0002] Garments may require to pass through needle detectors after they are finished and before they are shipped or sold to the customers. Needle detectors help to protect the customers from injuries caused by broken needles that have gotten into garments, clothing or the like during sewing. Garment accessories such as buckles, buttons and similar fastening devices are often part of the garment fashion and sewed onto garments before passing through needle detectors. However, metallic accessories such as these fastening devices may trigger alarms from needle detectors.

SUMMARY OF INVENTION

[0003] In the light of the foregoing background, it is an object of the present invention to provide a fastening device that can be sewed onto a garment. In particular the fastening device of the present invention does not trigger a false alarm from the needle detector.

[0004] Accordingly, the present invention, in one aspect, is a fastening device comprising a frame and the frame further comprising a plurality of metallic strips coupled contiguously to form an enclosure, thereby when the fastening device is attached to a garment and the garment is passed through a needle detector, the fastening device does not trigger a false alarm from the needle detector.

[0005] In one embodiment, the metallic strips are made from materials selected from a group of metallic materials having different ferromagnetic responses and at least two of the selected metallic strips have different ferromagnetic responses.

[0006] In a further embodiment of the present invention, the metallic strips comprise a U-shaped rim and a detachable rim to form an enclosure enclosing a space therein for an object to pass through. The detachable rim is detachably coupled to the U-Shaped rim.

[0007] In another further embodiment, the U-shaped rim is made from zinc alloy and the detachable rim is made from metallic materials selected from the group consisting of brass and copper.

[0008] In another further embodiment, a tongue is attached to the detachable rim. In yet another further embodiment, the U-shaped rim comprises a pair of pins at its ends and the detachable rim has a pair of holes at its ends. The pair of pins of the U-shaped rim is inserted into the pair of holes of the detachable rim when they are

detachably attached together.

[0009] In another further embodiment, the detachable rim is hollow or solid.

[0010] In another further embodiment, the detachable rim has a depression at the middle of it. In another further embodiment, the tongue has a hook at one end, and the hook is rotatably attached to the detachable rim to the depression

[0011] In another further embodiment, at least one insulating spacer is disposed in between the plurality of metallic strips of the frame.

[0012] The present invention in another aspect is a buckle comprises a U-shaped rim made of a first material having first ferromagnetic response; a detachable rim made of a second metallic material having a second ferromagnetic response; and a tongue. The detachable rim is detachably coupled to the U-shaped rim to form an enclosure for a belt to pass through. Thereby when the buckle is attached to a garment and the garment is passed through a needle detector, the buckle does not trigger a false alarm from the needle detector.

[0013] The advantage to the present invention is that there can be provided a fastening device that satisfies properties required for the use thereof, and does not trigger alarms from needle detectors. The present invented fastening device may not cause any malfunctions of the needle detectors.

BRIEF DESCRIPTION OF FIGURES

[0014] Fig. 1 is a top view of a buckle according to one embodiment of the present invention.

[0015] Fig. 2 is a side view of the buckle according to the same embodiment of the present invention.

[0016] Fig. 3 is a top view of a U-shaped rim according to the same embodiment of the present invention.

[0017] Fig. 4 shows a side view of the buckle observed from a detachable rim, according to the same embodiment of the present invention.

[0018] Fig. 5 shows one of the holes in the detachable rim, according to the same embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0019] As used herein and in the claims, "comprising" means including the following elements but not excluding others.

[0020] Garment merchandizers want to make sure that garments to be sold are free from broken needles that may inadvertently be left in the garments. For this purpose, a needle detector is used to detect any needle-like object in the garment. In general, a needle detector is developed solely to detect any elongated metallic object that has a small diameter of around 1.0 mm. to 1.2 mm. Many needle detectors operate as a metal detector by emitting electromagnetic (EM) wave to a space nearby.

A metal object in that space would disturb the EM wave. Such disturbance causes the detector to trigger an alarm. A needle detector is specifically tuned to detect the disturbance signature of needle-like objects with small diameter as stated above. However, it is found that some non-needle like metallic objects may also trigger alarms from the needle detector, as their disturbance signature is very similar to that of a broken needle. If such an object is attached to a garment, the garment will fail the needle detection test. But such false alarm is undesirable.

[0021] In one aspect of the present invention, a metallic fastening device that does not trigger false alarm when it is examined by a needle detector is disclosed. The device comprises a frame that is constructed by connecting a plurality of metallic strips connected contiguously together to form a closed loop. Since the metallic strips are electrically conducting materials, it would induce Eddy current when it is exposed to the changing EM wave of the needle detector and the needle detector would detect a disturbance signature of the metallic fastening device. If the disturbance signature is similar to that of a needle, then it would trigger a false alarm. However, the disturbance signature is dependent on the size and shape of the metallic fastening device, the material used in the metallic strips, and whether the metallic strip is a solid piece of metal or hollow at the center, etc. The size and shape are typically designed for esthetic considerations. Since different metallic materials have different ferromagnetic responses, they can be adapted to make the metallic strips that form the fastening device. As such, the overall disturbance signature can be adjusted by choosing the size and shape, as well as the material used for each metallic strip so that the fastening device satisfies the overall esthetic considerations yet it will not cause false alarm when it is examined by the needle detector.

[0022] In one implementation, the metallic materials used to make the metallic strips include zinc alloy, brass and copper.

[0023] In another embodiment of the present invention, there is provided insulting spacers in between the coupling metallic strips. The insulting spacer breaks the closed loop electromagnetic connection along the frame. Thus the amount of EDDY current generated would be reduced and this will alter the disturbance signature. In a further embodiment, the insulting spacer is made of rubber.

[0024] Referring to detail to the drawings, a specific realization of a buckle 20 embodying the embodiment of this invention is shown generally in Figs. 1, 2 and 4. The buckle is intended to, but not limited to, be attached to garments.

[0025] Referring to Fig. 1, one embodiment of the present invention, the metallic strips comprise a U-shaped rim 22, a detachable rim 26. The detachable rim 26 is detachably coupled to the U-shaped rim 22 to form an enclosure enclosing a space therein for an object, preferably but not limited to a belt, to pass through. The detachable rim 26 comprises a depression 28 at the mid-

dle of the detachable rim 26. A tongue 30 is attached to the detachable rim 26. The tongue 30 can be rotatably attached to the detachable rim 26 at the depression 28. A dent 24 is located at the upper surface of the U-shaped rim 22 for fittingly receiving the tongue 30.

[0026] In one embodiment, the detachable rim 26 is made by joining or fusing at least two metallic parts together. In a further embodiment, the at least two metallic parts have the same ferromagnetic response and the ferromagnetic response of U-shaped rim 22 is different from the at least two metallic parts. In another further embodiment, the at least two metallic parts and the U-shaped rim 22 have the same ferromagnetic response. In another further embodiment, the materials used for making the at least two metallic parts and the U-shaped rim 22 are selected from a group of brass or copper or zinc alloy. In another further embodiment, the at least two metallic parts and the U-shaped rim 22 (the at least two metallic parts and the U-shaped rim 22 are referred as components) are made from materials selected from a group of metallic materials having different ferromagnetic responses and at least two components have different ferromagnetic responses. In another further embodiment, the materials used for making the components are selected from a group of brass or copper or zinc alloy. In another further embodiment, each metallic part of the at least two metallic parts is either made from brass or copper and the U-shaped rim is made from zinc alloy.

[0027] In one embodiment, the U-shaped rim 22 and the detachable rim 26 have the same ferromagnetic response. In another embodiment, the materials for making the U-shaped rim 22 and the detachable rim 26 are selected from a group of metallic materials having different ferromagnetic responses. The U-shaped rim 22 and the detachable rim 26 have different ferromagnetic responses and the metallic materials used are chosen from a selected group of brass or copper or zinc alloy. In another embodiment, the U-shaped rim 22 is made from zinc alloy and the detachable rim 26 is made from brass or copper.

[0028] Referring now to Fig. 2, the tongue 30 at one end further comprises a hook 32. The hook 32 comprises a curved portion 40 substantially forms a circle. The hook 32 is rotatably attached to the detachable rim 26 at the depression 28 as seen in Fig. 1. The curved portion 40 of the hook 32 circularly encloses the depression 28. The tongue 30 has an offset 44 near or next to the hook 32. The tongue 30 further has a bend 46 at the other end. The bend 46 curves in a direction that is opposite to a direction that the offset 44 curves. The U-shaped rim 22 is curved when viewed from the side. The tongue 30 is preferably used to pass through a hole provided on the belt or other similar garments to secure the position of the belt or other similar garments.

[0029] Fig. 3 shows only the U-shaped rim 22 of the buckle 20 of the embodiment of the present invention. The U-shaped rim 22 has a pair of pins, which comprise a U-shaped pin 34 and an inclined pin 36. The U-shaped pin 34 and the inclined pin 36 are located at the ends of

the U-shaped rim 22. Particularly, the pins are located at a coupling interface 42 between the U-shaped rim 22 and the detachable rim 26.

[0030] Referring now to Figs. 4 and 5, the U-shaped pin 34 and the inclined pin 36 are located at the lower portion of the U-shaped rim 22. When coupling the detachable rim 26 and the U-shaped rim 22 together, the U-shaped pin 34 and the inclined pin 36 are inserted into the holes 38 (Fig. 5) at the ends of the detachable rim 26. Thereby, the detachable rim 26 can be securely attached to the U-shaped rim 22 at the coupling interface 42 of the U-shaped rim 22. It is easier to attach the detachable rim 26 to the U-shaped rim 22 with the help of the combined structure of the U-shaped pin 34 and the inclined pin 36.

[0031] In one embodiment, an insulting spacer is disposed in between the U-shaped pin 34 and the hole 38 at one end of the detachable rim 26. In a further embodiment, another insulting spacer is disposed in between the inclined pin 36 and the hole 38 at the other end of the detachable rim 26.

[0032] In another further embodiment, the widest part of the U-shaped rim 22 is about 35.2mm and the length of the U-shaped rim 22 is about 34.2mm. The length of the detachable rim 26 is about 24mm. The width of depression 28 of the detachable rim 26 is about 3.5mm. The depth of each hole 38 of the detachable rim 26 is about 4mm. The height and the width of each of the pair of pins, the U-shaped pin 34 and the inclined pin 36, is about 2.5mm and 2.2mm respectively. Regarding the tongue 30, the length and the width of it are about 32.8mm and 3mm respectively.

[0033] In one embodiment, the detachable rim 26 is in cylindrical shape. In a further embodiment, the detachable rim 26 can be hollow or solid. In yet another embodiment, the radius of the cylindrical shaped detachable rim 26 is about 2mm and the length is about 24mm. Although the detachable rim 26 is illustrated as cylindrical shape, the detachable rim 26 can be in other shapes, for example, rectangular and other similar shapes.

[0034] These dimensions, as well as the material used for the U-shape rim 22 and the detachable rim 26, is found to produce a buckle whose disturbance signature under a needle detector is substantially different from that of a broken needle. Hence it does not trigger an alarm when it is put to test under the needle detector.

[0035] The exemplary embodiments of the present invention are thus fully described. Although the description referred to particular embodiments, it will be clear to one skilled in the art that the present invention may be practiced with variation of these specific details. Hence this invention should not be construed as limited to the embodiments set forth herein.

[0036] For example, the shape, dimensions and metallic material used in the buckle 20 is but one exemplary realization of the disclosed invention. Other dimensions can also be used.

[0037] As mentioned above, the detachable rim 26 can

be made out of copper. In another embodiment, it can also be constructed using a copper sheet of proper dimension, and roll it into cylindrical shape.

[0038] While a buckle is used as illustrative example in this specification, it is obvious that, other metallic objects such as buttons or ornaments with metallic content, can also be designed based on the invention principle disclosed in this specification to pass the needle detector. Hence this invention disclosure does not just cover buckle only but also buttons and other similar fastening devices.

Claims

1. A fastening device comprising a frame comprising a plurality of metallic strips coupled contiguously to form an enclosure; wherein said metallic strips are made out of materials selected from a group of metallic materials having different ferromagnetic responses and at least two of said selected metallic strips have different ferromagnetic responses; thereby when said fastening device is attached to a garment and said garment is passed through a needle detector, said fastening device does not trigger a false alarm from said needle detector.
2. The fastening device according to claim 1, wherein said metallic strips comprise a detachable rim and a U-shaped rim to form an enclosure enclosing a space therein for an object to pass through, wherein said detachable rim detachably coupled to said U-shaped rim.
3. The fastening device according to claim 2 wherein said U-shaped rim is made from said zinc alloy and said detachable rim is made from metallic materials selected from the group consisting of brass and copper.
4. The fastening device according to claim 3, wherein a tongue is attached to said detachable rim of said fastening device frame.
5. The fastening device according to claim 4, wherein said U-shaped rim comprises a pair of pins at its ends; and said detachable rim has a pair of holes at its ends to receive said pair of pins of said U-shaped rim when said detachable rim and said U-shaped rim are detachably coupled together.
6. The fastening device according to claim 5, wherein said detachable rim is hollow or solid.
7. The fastening device according to claim 6, wherein said detachable rim has a depression at the middle of it.

8. The fastening device according to claim 7, wherein said tongue has a hook at one end; and said hook is rotatably attached to said detachable rim at said depression. 5
9. The fastening device according to claim 1, wherein at least one insulating spacer is disposed in between said plurality of metallic strips.
10. A buckle comprising 10
- a. a U-shaped rim made of a first metallic material having a first ferromagnetic response; and
- b. a detachable rim made of a second metallic material having a second ferromagnetic response; said detachable rim being detachably coupled to said U-shaped rim to form an enclosure for a belt to pass through 15
- thereby when said buckle is attached to a garment and said garment is passed through a needle detector, said buckle does not trigger a false alarm from said needle detector. 20
11. The buckle according to claim 10 further comprises a tongue being attached to said detachable rim. 25
12. The buckle according to claim 11 wherein said first metallic material is zinc alloy.
13. The buckle according to claim 12, wherein said second metallic material is selected from the group consisting of brass and copper. 30

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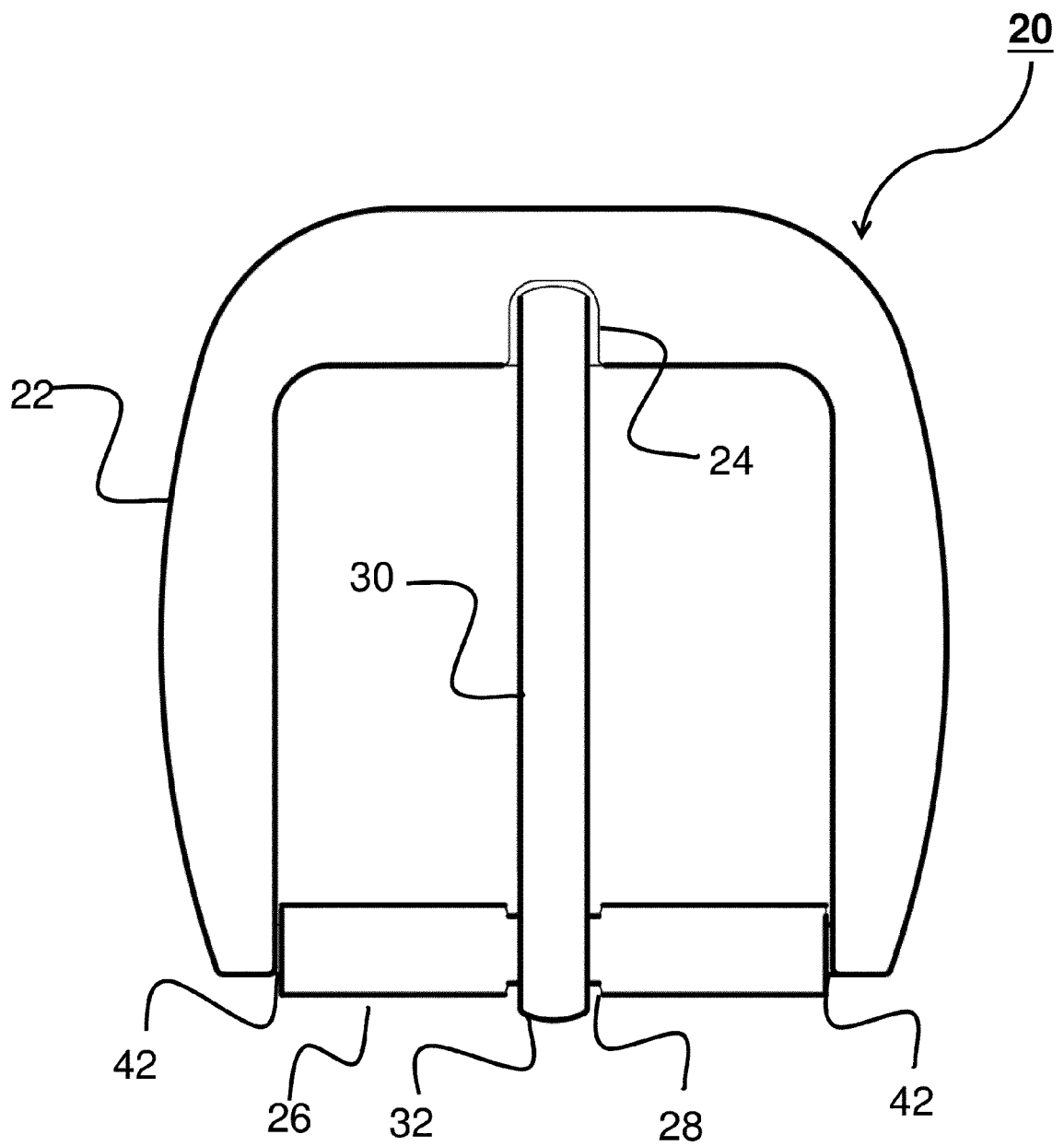


Fig.1

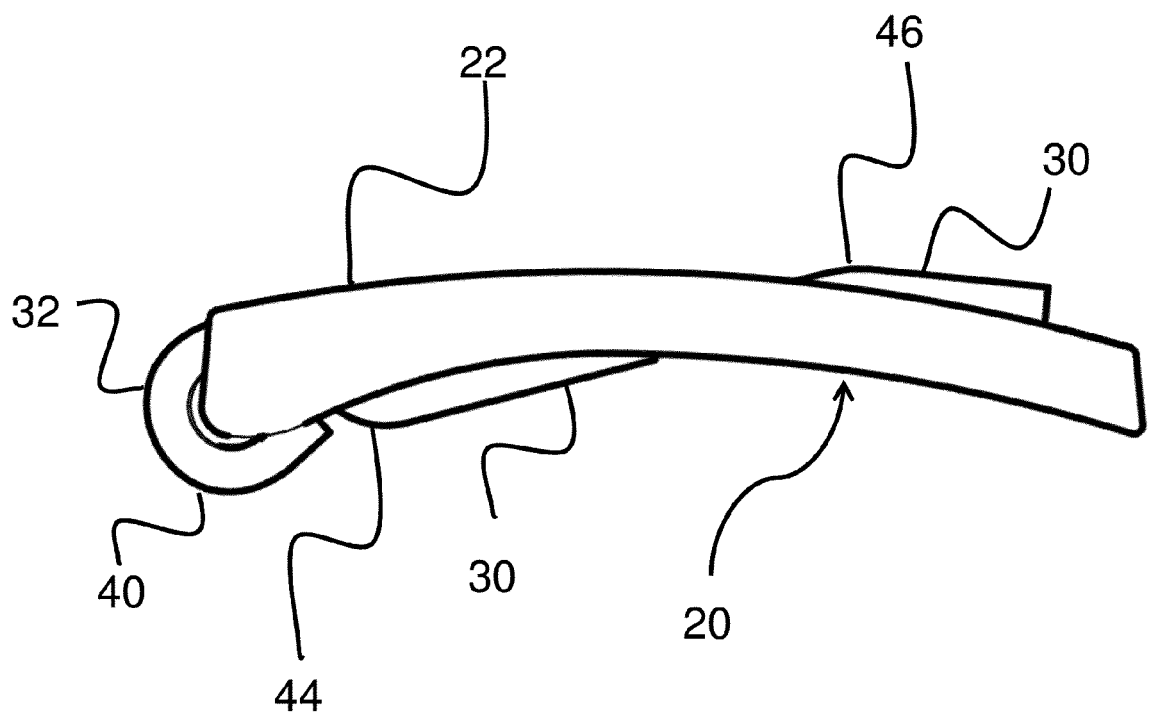


Fig. 2

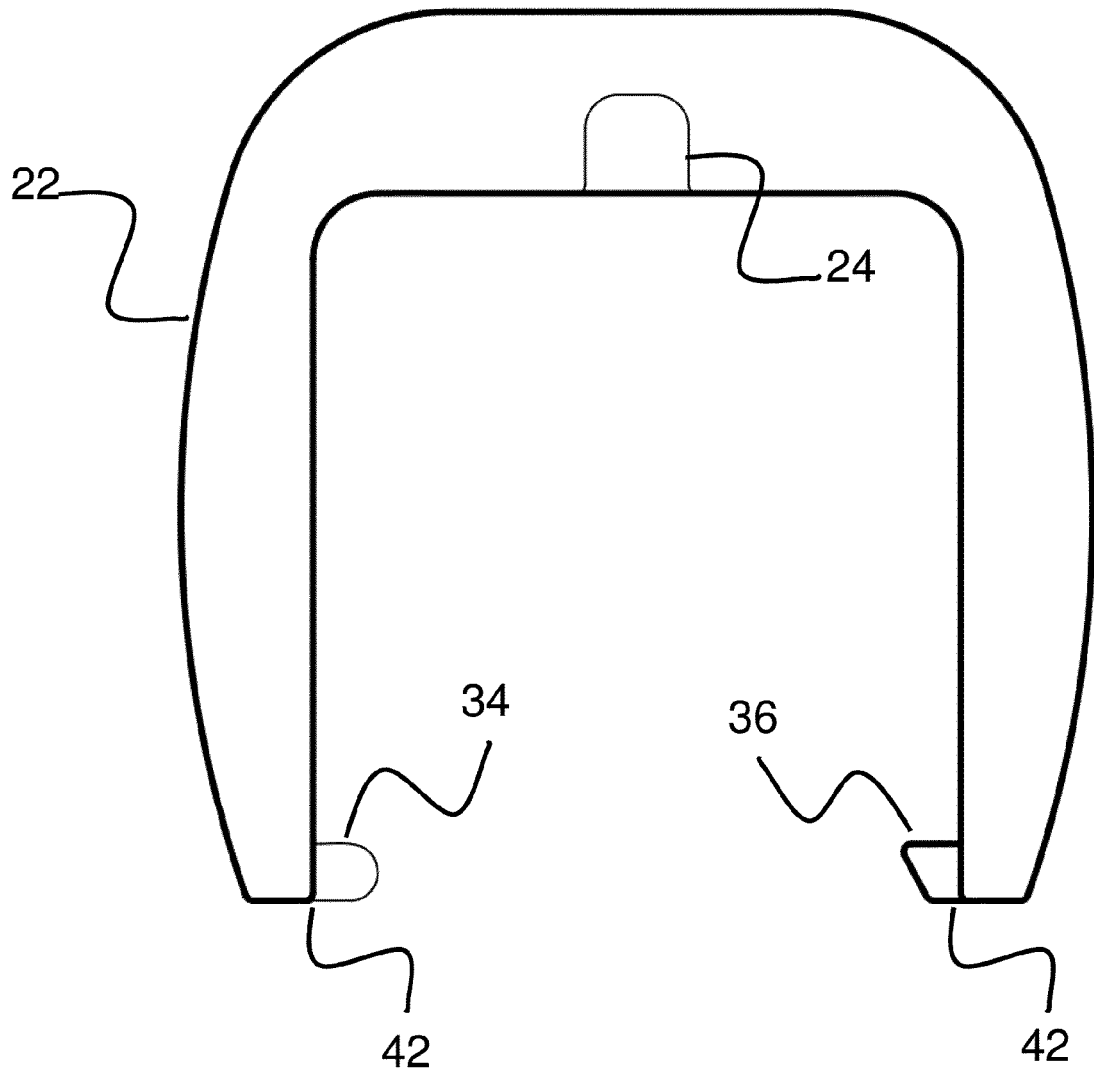


Fig. 3

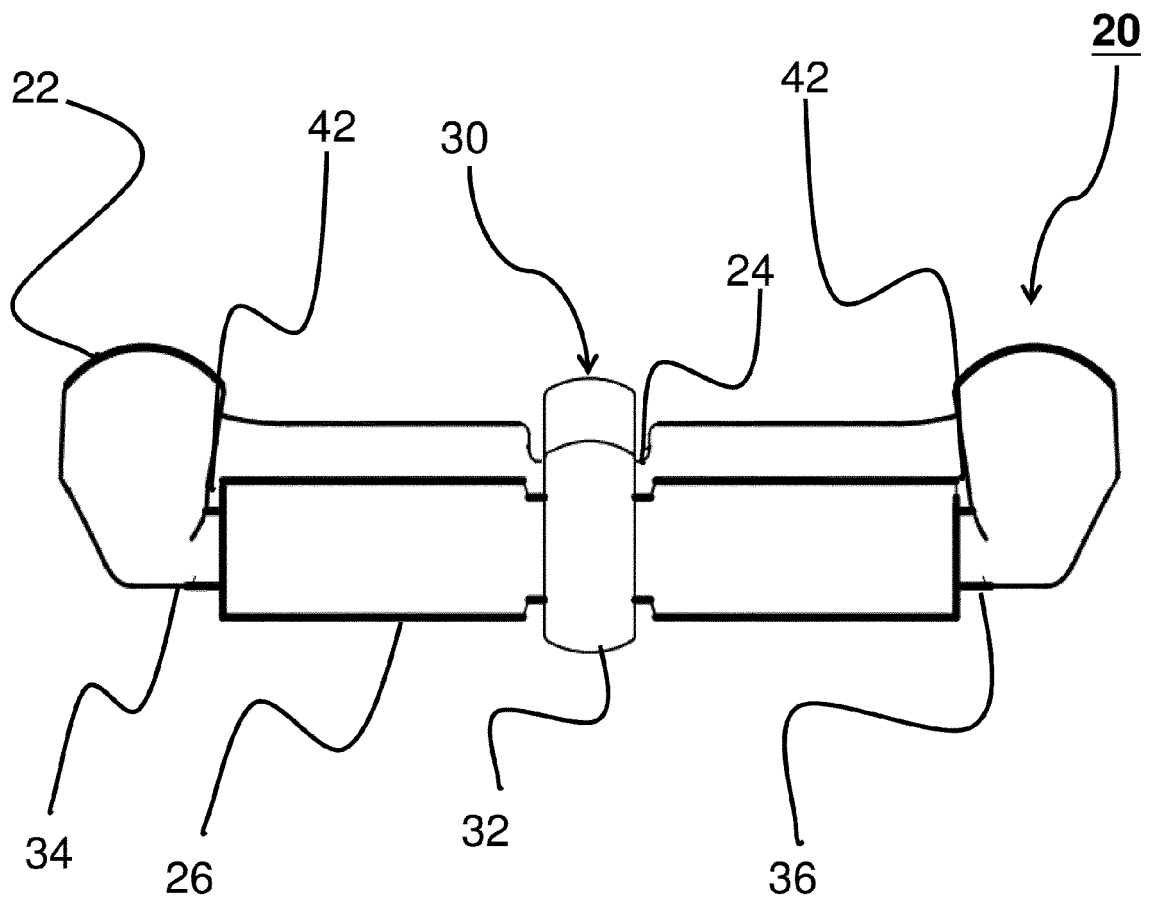


Fig. 4

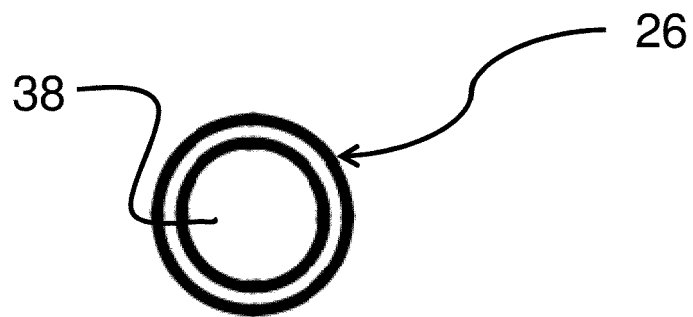


Fig. 5