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(54) **Titre : DISPOSITIF DE CONNEXION DE SECURITE POUR LES RENES**
(54) **Title: REIN SAFETY CONNECTOR DEVICE**

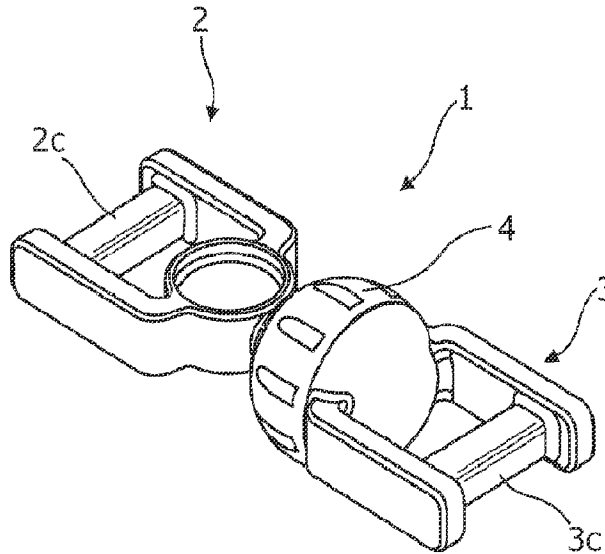


Figure 1

(57) **Abrégé/Abstract:**

A rein safety connector device comprises a ball component, a socket component and a retaining member. The ball component includes a ball and the socket component includes a socket shaped to receive the ball. The socket includes an opening having a diameter smaller than the diameter of the ball, the opening being configured for expansion upon application of a first force along a longitudinal axis of the socket component in a first direction by the ball of said ball component and retraction upon removal of said force. The retaining member is attachable to the socket component around the opening thereof to secure the ball of the ball component in the socket of said socket component, the ball being releasable from the socket when subject to a second force, greater than the first force along said longitudinal axis in a second direction.

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Abstract:

A rein safety connector device comprises a ball component, a socket component and a retaining member. The ball component includes a ball and the socket component includes a socket shaped to receive the ball. The socket includes an opening having a diameter smaller than the diameter of the ball, the opening being configured for expansion upon application of a first force along a longitudinal axis of the socket component in a first direction by the ball of said ball component and retraction upon removal of said force. The retaining member is attachable to the socket component around the opening thereof to secure the ball of the ball component in the socket of said socket component, the ball being releasable from the socket when subject to a second force, greater than the first force along said longitudinal axis in a second direction.

Rein Safety Connector Device

Field of the Invention

The present invention relates to a safety device for a pair of reins and in particular a connector device that permits a pair of reins to break when subject to certain force.

Background of the Invention

When horse, ponies, donkeys and other animals are ridden they are typically provided with a bridle and reins. The reins connect to a bit which is attached to the bridle, or in the case of bites bridles to rein attachment points. Reins are typically provided in pairs. Whilst in some styles of riding the reins of the pair are not connected together at their ends remote from the bit, in many styles the individual reins are connected together at their ends remote from the bit. The connection is usually provided by a buckle, or the reins may be stitched together.

One disadvantage of reins that are attached to each other at their ends remote from the bit is that if the reins become caught on an object, a dangerous situation may arise. For example, in the case of a rider falling from a horse it is not uncommon for a limb of the rider to become caught in the reins. This can be extremely dangerous, resulting in the rider being dragged by the horse. It is also known for the reins to become caught around an object. The object may be one that is being passed by the horse and rider, such as a hook on a gate post for example.

In any situation where a force is applied to the reins other than under the control of the rider, there is the potential for a dangerous situation to arise.

It has been proposed to provide a connector for connecting the free ends of the reins of a pair together that permits the reins to separate when the connector is subjected to a certain force.

The problem described above is longstanding and well known. Numerous attempts have been made to provide a connection that will break when subject to a threshold force.

For example, US 6,098,384 describes an inset which attaches to the ends of a standard pair of reins having buckle connector. The insert includes a frangible buckle. If the reins are subject to a threshold force, the frangible buckle will break and the reins come apart.

WO2017164870 is another example of an insert positioned between the free ends of a pair of reins which include hook and loop material. When a force is exerted on the reins that is sufficient to detach the hook material from the loop material, the connection between the free ends of the reins is broken.

DE202011105589U describes another alternative connector which is designed to release when the reins are subject to a threshold force.

Whilst numerous attempts have been made addressing the problem described above, none of the solutions have been adopted widely. In the case of a frangible buckle, if the buckle is broken, reconnecting the free ends of the reign is not straightforward. The broken part of the buckle must be replaced for example. In general, inserts can change the balance of the reins which may make them undesirable for the rider. The feel of the rein in the riders hands can be affected by adding additional weight to the ends of the reins remote from the bit or connection to the bridle.

It would therefore be desirable to provide an improved releasable connector for connecting together the free ends of a pair of reins.

It would also be desirable to provide a pair of reins including such an improved releasable connector.

5 **Summary of the Invention**

According to a first aspect of the invention there is provided a rein safety connector device, the device comprising a ball component including a ball, a socket component including a socket shaped to receive the ball, and a retaining member, the socket including an opening having a diameter smaller than the diameter of the ball, the opening being configured for expansion upon application of a first force along a longitudinal axis of the socket component in a first direction by the ball of said ball component and retraction upon removal of said force, wherein the retaining member is attachable to the socket component around the opening thereof to secure the ball of the ball component in the socket of said socket component, the ball releasable from the socket when subject to a second force, greater than the first force along said longitudinal axis in a second direction.

The second force may be related to the weight of a rider. For example, the rein safety connector may be configured differently according to different weights of rider. For a child weighing between 12 and 30kgs, the rein safety connector may be configured such that the second force is 150N, whereas for an adult weighing 30-50kgs, the rein safety connector may be configured such that the second force is 300N.

Preferably, the retaining member is attachable to the socket component by means of a rotational coupling, wherein the retaining member and the socket component each comprise a respective part of the rotational coupling.

The rotational coupling may comprise co-operating internal and external
5 threads on respective ones of the socket component and the retaining member.

Preferably, the retaining member is attachable to the socket component such that the retaining member is immediately adjacent to the opening of the socket component.

Preferably, the retaining member is attachable to the socket component after
10 insertion of the ball into the socket of the socket component.

When the rein safety connector device as hereinbefore defined is subjected to the second force, the ball is released from the socket. The device may then be reassembled by passing the ball through the retaining member, pushing the ball back into the socket, and then re-attaching the retaining member to the socket component.

Advantageously, the opening is defined by a plurality of leaves, each leaf
15 moveable outwards relative to said longitudinal axis when subject to said first or second force.

Each leaf may include a region of reduced thickness, said region distal from the opening and forming part of the socket.

Preferably, the socket component part of the rotational coupling is situated
20 beyond the leaves, distal from the opening.

The ball component may comprise a central portion and wherein the ball is attached to the central portion by a ball connector.

The central portion may include a wall, the ball connector extending from the wall.

Preferably, the wall surrounds an opening or a region of material.

Advantageously, the depth of the material surrounded by the wall is smaller
5 than the depth of the wall.

The retaining member may be provided with grip elements.

Each of the ball component and the socket component may be provided with rein attachment elements.

The ball component may be fabricated from a metal or a metal alloy and the
10 socket component and retaining member may be respective one-piece plastics mouldings. Preferably the ball component is a one-piece metal or metal alloy casting. Preferably the ball component is fabricated from a metal or metal alloy selected from the group comprising: zinc, aluminium and steel.

Alternatively, each of the ball component, socket component and retaining
15 member are respective one-piece plastics mouldings.

Preferably, the or each one-piece plastics moulding is fabricated from a plastic selected from the group comprising: nylon or polypropylene.

The socket component and the retaining member are preferably each one-piece plastic mouldings, fabricated from plastic selected from the group comprising:
20 nylon or polypropylene.

The ball component may be fabricated from a zinc casting and both the retaining ring component and socket component may be fabricated from a one-piece polypropylene moulding.

The ball component may be fabricated from a zinc casting, the retaining ring component may be fabricated as a one-piece nylon moulding, and the socket component may be fabricated from a one-piece polypropylene moulding.

5 The ball component may be fabricated from a zinc casting and both the retaining ring component and socket component may be fabricated from a one-piece nylon moulding.

Advantageously, the retaining member is configured such that when the ball is subjected to the second force, the retaining member expands within its elastic limit. This allows the opening of the socket to expand, releasing the ball of the ball
10 component from the socket of the socket component.

According to another aspect of the invention there is provided the combination of the rein safety device according to the first aspect of the invention and a pair of reins, one of the pair attached to the socket component and the other of the pair attached to the ball component.

15 According to a third aspect of the invention there is provided a bridle including the combination of the second aspect of the invention.

Brief Description of the Drawings

In the Drawings, which illustrate preferred embodiments of the invention, and
20 are by way of example:

Figure 1 is a schematic illustration of a ball and socket safety device according to the invention;

Figure 2 is an exploded view of the safety device illustrated in Figure 1;

Figure 3 is a schematic representation of the component including the ball of the safety device illustrated in Figure 1;

Figure 4 is a plan view of the component illustrated in Figure 3;

5 4; Figure 5 is a cross-section on axis A-A of the component illustrated in Figure

Figure 6 is a schematic representation of the component including the socket of the safety device illustrated in Figure 1;

Figure 7 is a plan view of the component illustrated in Figure 6;

10 7; Figure 8 is a cross-section on axis A-A of the component illustrated in Figure

Figure 9 is an end view of the component illustrated in Figure 6;

Figure 10 is cross-section on axis C-C;

Figure 11 is an end view of a retaining ring component of the safety device illustrated in Figure 1;

15 11; Figure 12 is a cross-section on axis A-A of the component illustrated in Figure

12; Figure 13 is a cross-section on axis C-C of the component illustrated in Figure

20 partial assembly; Figure 14 is an exploded view of the safety device of the invention in a state of

Figure 15 is an end view of the safety device illustrated in Figure 1;

Figure 16 is a longitudinal cross-section on the axis A-A of Figure 15; and

Figure 17 is a schematic illustration of bridle and rein set according to the invention.

Detailed Description of the Preferred Embodiments

Referring now to Figures 1 and 2, the safety device 1 of the invention comprises a ball component 2, a socket component 3 and a retaining ring component 4. As can be appreciated from Figures 1 and 2, the ball of the ball component is passed through the ring component 4 and is pushed into the socket component 3. The retaining ring component 4 has a larger inner diameter larger than the diameter of the ball 2d, allowing the ball 2d to pass through the ring component 4.

In the illustrated example, the ball component is formed as a one-piece zinc casting which comprises a central portion from which extend elongate side members 2b which are connected together by a cross-member 2c at the ends of the elongate side members 2b remote from the central portion 2a. The ball 2d of the ball component 2 is also connected to the central portion 2a by a connector 2e. In use, a free end of one rein of a pair passes around the cross member 2c to fasten the rein to the ball portion 2. The ball component may also be formed as a one-piece plastics moulding.

The socket component 3 is formed as a one-piece plastics moulding comprising a socket element 3a from which extend side members 3b. The ends of the side members distal from the socket element 3a are connected together by a cross-member 3c at the ends of the elongate side members 3b. The socket element 3a (which is described in greater detail in Figures 6 to 10) comprises a socket base 3a' and a plurality of socket leaves 3a'' and an externally threaded region 3d.

The retaining ring component 4 comprises an internal thread 4a which is configured to co-operate with the external thread 3d of the socket component. The

retaining ring 4 is provided with external grip elements provided by depressions 4b formed in the outer surface of the retaining ring 4.

The ball component 2 is illustrated in greater detail in Figures 3 to 5. The central portion 2a comprises an outer wall 2a' having a first depth and a region 2a'' that is surrounded by the wall 2a' and which has a depth less than the thickness of wall 2a'. The central portion 2a therefore provides a convenient part to grip when a user is connecting the ball 2d of the ball component 2 to the socket 3a of socket component 3. In the illustrated embodiment, the region 2a'' has a diameter of 12mm and the outer wall 2a' has a diameter of 14mm, the wall having a thickness of 1mm.

The wall 2a' adds strength and rigidity to the whole ball component 2 as well as providing a suitably dimensioned element for the connector 2e to extend from. In the illustrated embodiment, the wall has a depth of 7.3mm, whereas the region 2a'' has a depth of 3.3mm.

Figures 6 to 10 illustrate the socket component 3 in greater detail. The socket 3a comprises a socket base 3a' in which the ball 2d is received and an open end through which the ball 2d is inserted, the open end defined by a plurality of adjacent socket leaves 3a''. The internal diameter of the socket base 3a' has substantially the same diameter as the external diameter of the ball 2d.

In order to attach the ball 2d to the socket 3a the ball 2d is presented up to the open face of the socket 3a. As the outer surface of the ball 2d engages the end faces of the socket the leaves 3a'', the socket leaves 3a'' are pushed outward thereby allowing the ball 2d to be pushed into the socket base 3a'. The diameter of the open end of the socket 3a is 12mm as shown in Figure 2. Whereas the diameter of the socket is 13mm. The diameter changes at the plane Y-Y illustrated in Figure 16.

When the widest part of the ball 2d moves past the plane Y-Y in the direction Z, the socket leaves 3a" return to their closed configuration, and assist in pushing the ball into the position shown in Figure 16 where the outer surface of ball 2d is in contact with the inner surface 3e of the socket 3a.

5 Figure 14 illustrates the sequence of assembly of the ring 4 relative to the ball component 2 and the socket component 3. The ball 2d is passed through the ring 4. The internal diameter of the ring 4 is larger than the external diameter of the ball 2, the ring having an internal diameter of 16mm compared to the external diameter of 13mm of the ball 2d, in the illustrated example. After the ball has been pushed into
10 the socket 3a, the ring 4 is presented up to and aligned with the threads 3d of the socket 3a. The ring 4 is then rotated relative to the socket so that the internal threads 4a of the ring engage with the external threads 3d of the socket 3a. The ring 4 is rotated until it is tight relative to the socket 3a.

In this example, the socket component and retaining ring component of the
15 safety device 1 are formed from a polypropylene material, preferably the same polypropylene material. The plastics material from which these components are formed is sufficiently flexible to allow the ball and socket to be pulled apart when sufficient force is applied, without fracturing any components and without deforming any components beyond their elastic limits. In the event that an incident occurs in
20 which the reins become caught on an object, if sufficient force is applied to the safety device 1 pulling the ball 2d out of socket 3a, those components will separate. In most circumstances the disconnection of the ball from the socket will allow the reins to pull free from the object upon which the rein was caught.

In order to reassemble the safety device 1, the ring 4 is rotated such that the threaded region 4a of the ring 4 comes away from the threaded region 3e of the socket 3a. The ring 4 is passed over the ball 2d as described above, and the ball 2d is inserted into the socket 3a. The ring 4 is then tightened onto the socket 3a as described above.

Figure 17 illustrates a bridle 5, including a bit 6, with a rein set 7 attached to the bit 6. The rein set includes a safety device 1 of the type described in Figures 1 to 16, the rein 7a being attached to cross-member 3c and the rein 7b being attached to the cross-member 2c, the respective other ends of reins 7a, 7b being attached to bit rings 6a and 6b respectively.

In a preferred example, suitable for child riders weighing up to approximately a maximum of 30kg, the ball component is fabricated from a zinc casting and has a diameter of approximately 11.5 mm. The socket component 3 and the retaining ring component 4 are each formed as one-piece polypropylene mouldings. The retaining ring component has an inner diameter of 15.8 mm.

In a further preferred example, suitable for riders weighing up to approximately a maximum of 50kg, the ball component is fabricated from a zinc casting and has a diameter of approximately 12.1 mm. The socket component 3 is formed as a one-piece nylon moulding, and the retaining ring component 4 is formed as a one-piece polypropylene moulding. The retaining ring component has an inner diameter of 15.8 mm.

In a further preferred example, suitable for riders weighing up to approximately a maximum of 80kg, the ball component is fabricated from a zinc casting and has a diameter of approximately 12.1 mm. The socket component 3 and the retaining ring

component 4 are each formed as one-piece nylon mouldings. The retaining ring component has an inner diameter of 15.8 mm.

All of the parts of the safety device of the invention which are described as being fabricated from metal or metal alloys could also be fabricated from plastics; and the parts described as being fabricated from plastics materials could also be fabricated from metal without deviating from the scope of the invention.

Claims

1. A rein safety connector device, the device comprising a ball component including a ball, a socket component including a socket shaped to receive the ball, and a retaining member, the socket including an opening having a diameter smaller than the diameter of the ball, the opening being configured for expansion upon application of a first force along a longitudinal axis of the socket component in a first direction by the ball of said ball component and retraction upon removal of said force, wherein the retaining member is attachable to the socket component around the opening thereof to secure the ball of the ball component in the socket of said socket component, the ball releasable from the socket when subject to a second force, greater than the first force along said longitudinal axis in a second direction
2. A rein safety device according to any preceding claim, wherein the retaining member is attachable to the socket component such that the retaining member is immediately adjacent to the opening of the socket component.
3. A rein safety device according to Claim 1 or 2, wherein the retaining member is attachable to the socket component by means of a rotational coupling wherein the retaining member and the socket component each comprise a respective part of the rotational coupling.
4. A rein safety device according to any preceding claim, wherein the rotational coupling comprises co-operating internal and external threads on respective ones of the socket component and the retaining member.

5. A rein safety device according to any preceding claim, wherein the opening is defined by a plurality of leaves, each leaf moveable outwards relative to said longitudinal axis when subject to said first or second force.
6. A rein safety device according to Claim 5, wherein each leaf includes a region of reduced thickness, said region distal from the opening and forming part of the socket.
7. A rein safety device according to Claim 5 or 6 when dependent on Claim 3 or 4, wherein the socket component part of the rotational coupling is situated beyond the leaves, distal from the opening.
8. A rein safety device according to any preceding claim, wherein the ball component comprises a central portion and wherein the ball is attached to the central portion by a ball connector.
9. A rein safety device according to Claim 8, wherein the central portion includes a wall, the ball connector extending from the wall.
10. A rein safety device according to Claim 9, wherein the wall surrounds an opening or a region of material.
11. A rein safety device according to Claim 10, wherein the depth of the material surrounded by the wall is smaller than the depth of the wall.
12. A rein safety device according to any preceding claim, wherein the retaining member is provided with grip elements.
13. A rein safety device according to any preceding claim, wherein each of the ball component and the socket component is provided with rein attachment elements.

14. A rein safety device according to any preceding claim, wherein the ball component is fabricated from a metal or a metal alloy, and the socket component and retaining member are respective one piece plastics mouldings.
- 5 15. A rein safety device according to any of Claims 1 to 13, wherein each of the ball component, socket component and retaining member are respective one piece plastics mouldings.
16. A rein safety device according to any of claims 1 to 15, wherein the one piece plastics moulding is fabricated from nylon or polypropylene.
- 10 17. A rein safety device according to Claim 14, wherein the ball component is a one piece metal or metal alloy casting.
18. A rein safety device according to Claim 14 or 17, wherein the ball component is fabricated from a metal or metal alloy selected from the group comprising: zinc, aluminium and steel.
- 15 19. A rein safety device according to any preceding claim, wherein the retaining member is configured such that when the ball is subjected to the second force, the retaining member expands within its elastic limit.
20. The combination of the rein safety device according to any of Claims 1 to 19 and a pair of reins, one of the pair attached to the socket component and the other of the pair attached to the ball component.
- 20 21. A bridle including the combination of Claim 20.
- .

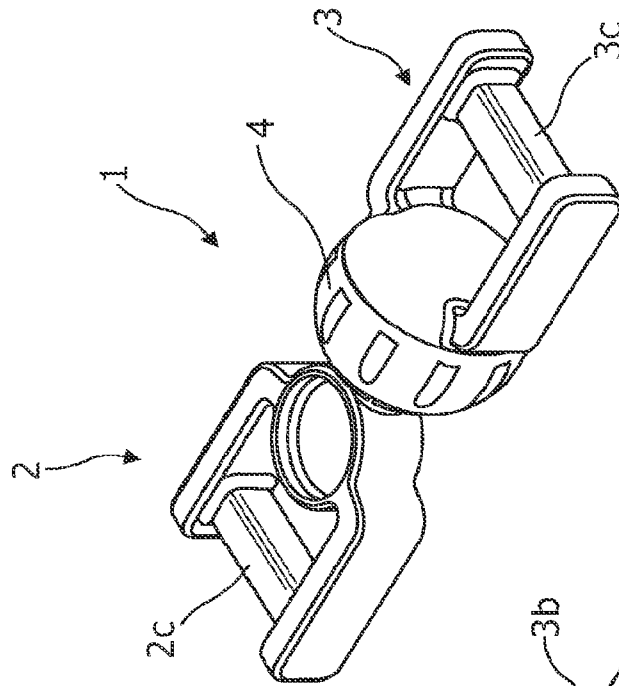


Figure 1

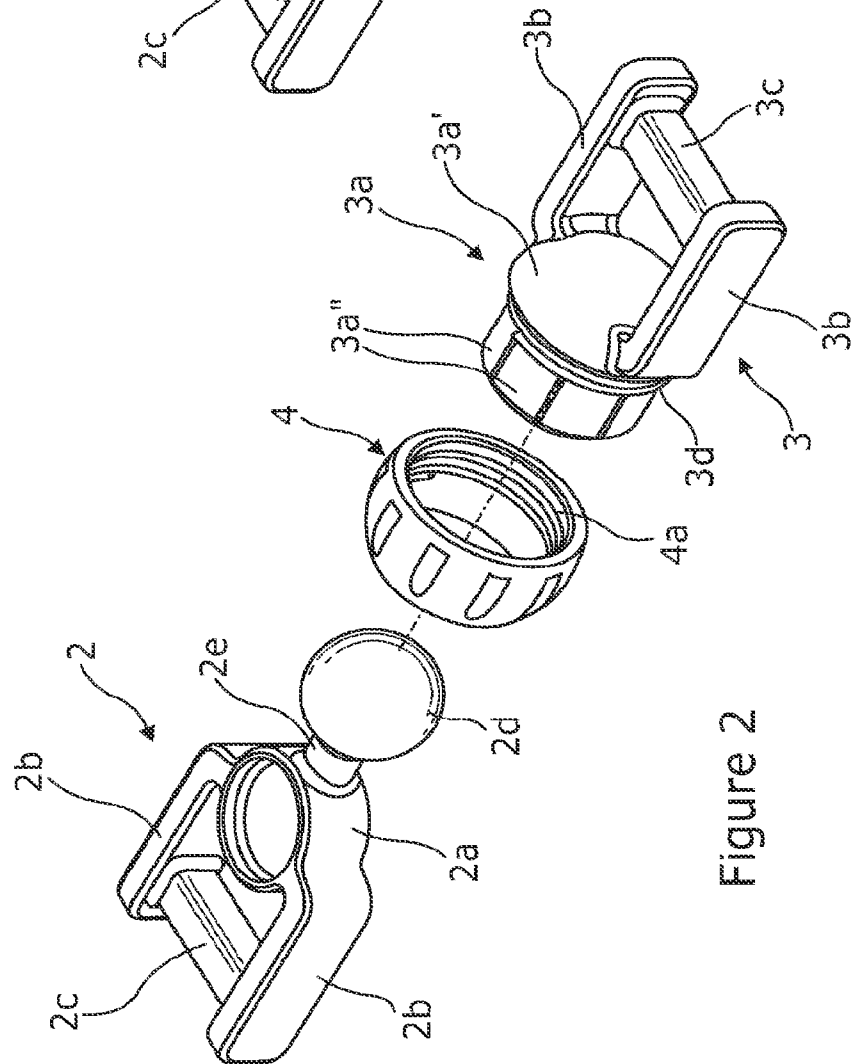


Figure 2

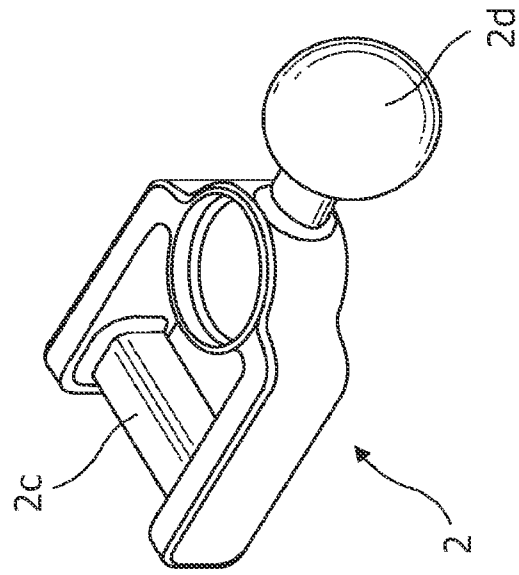


Figure 3

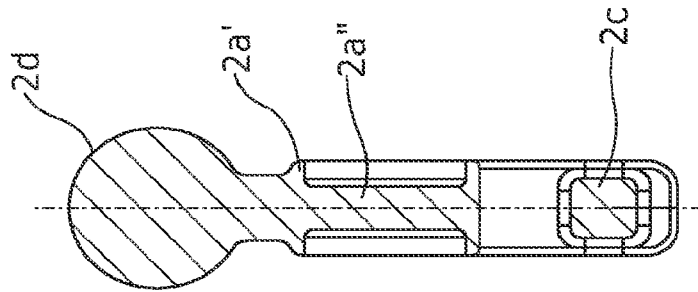


Figure 5

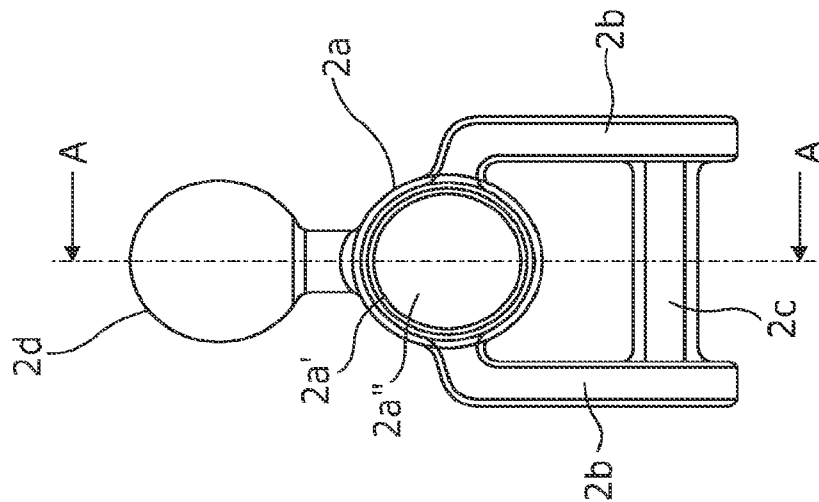


Figure 4

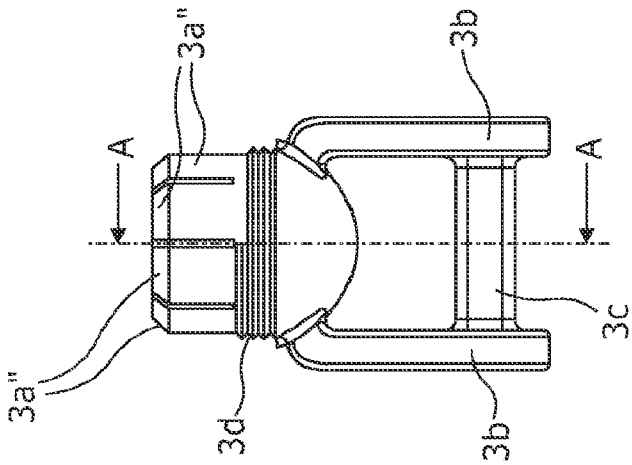
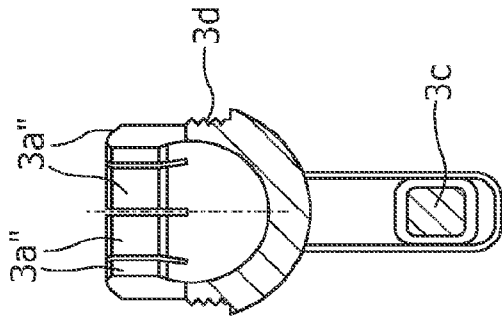


Figure 7



SECTION A-A

Figure 8

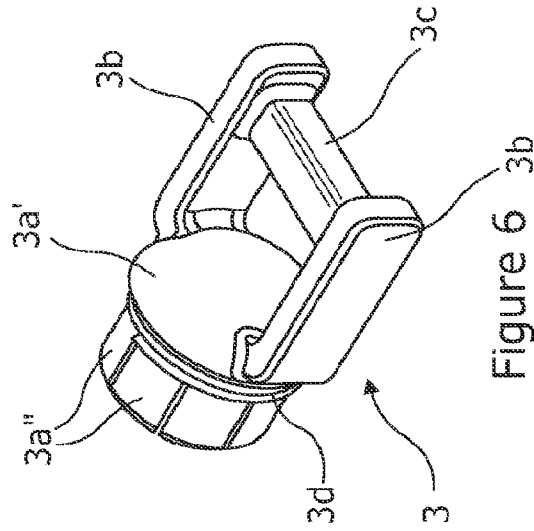
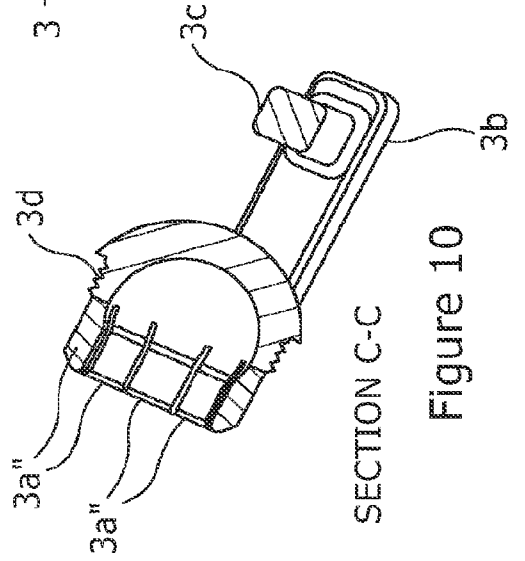


Figure 6



SECTION C-C

Figure 10

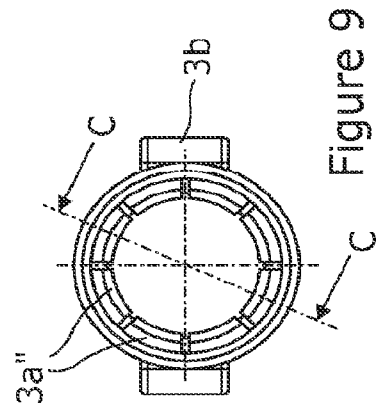


Figure 9

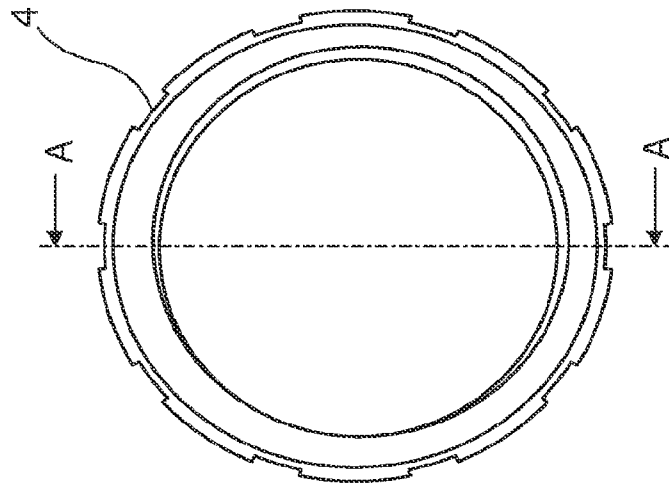


Figure 11

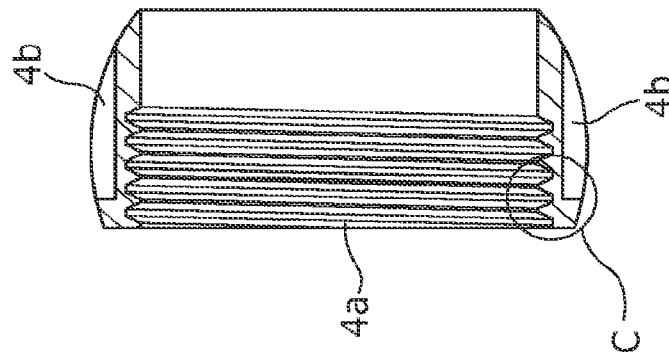


Figure 12

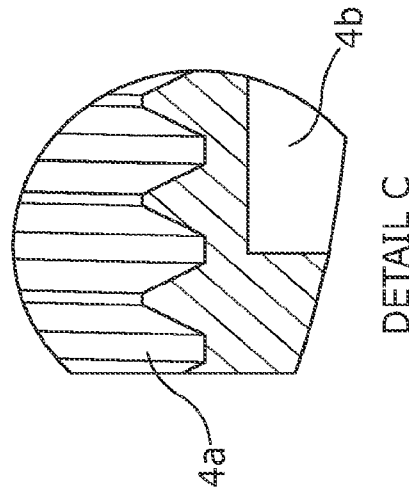


Figure 13

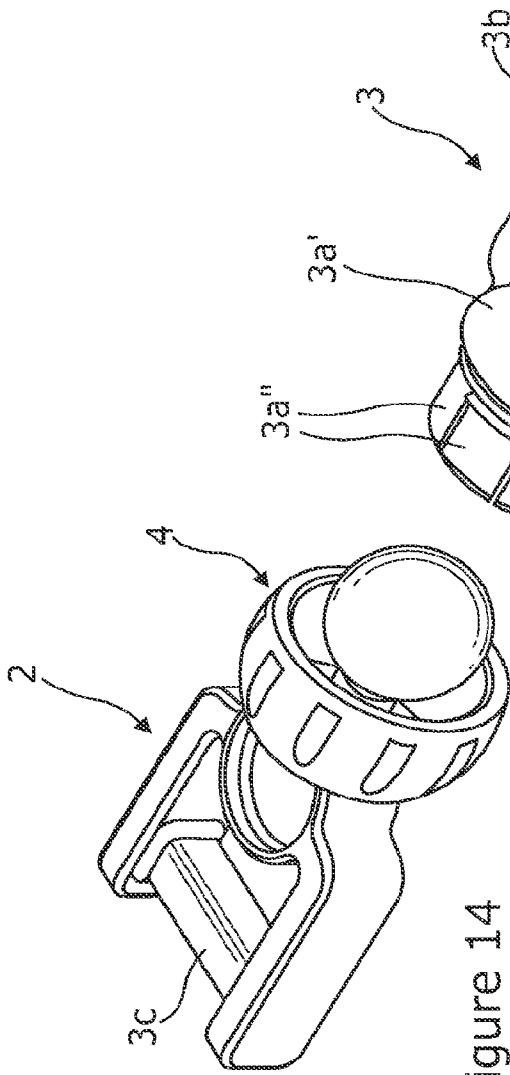


Figure 14

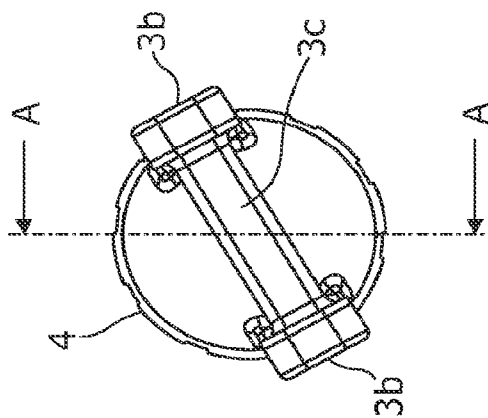


Figure 15

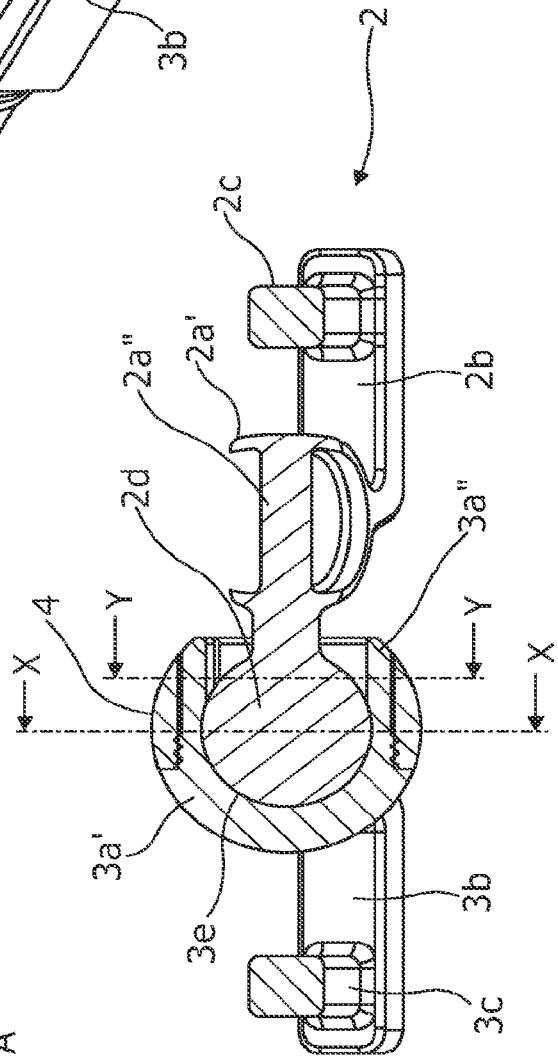


Figure 16

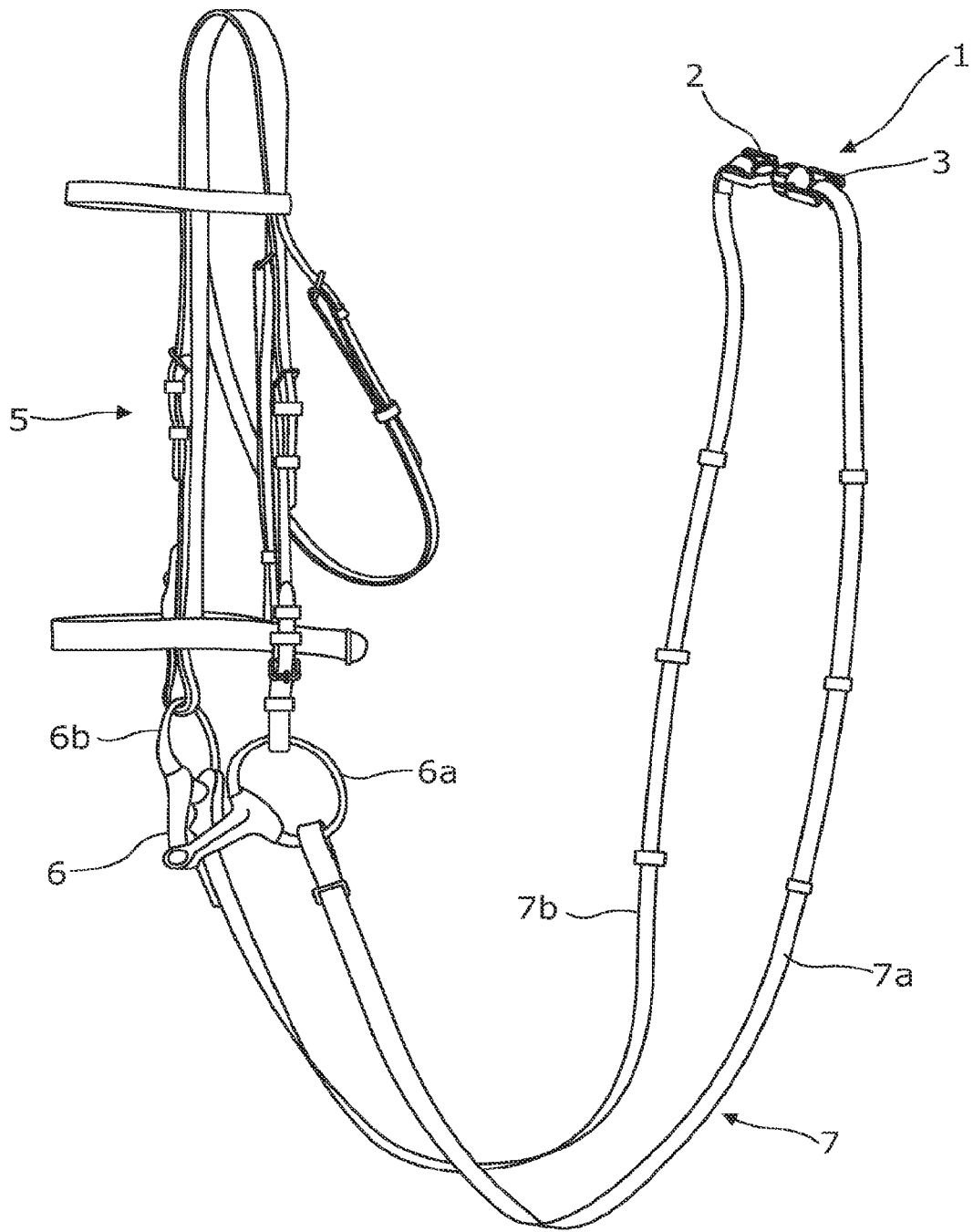


Figure 17

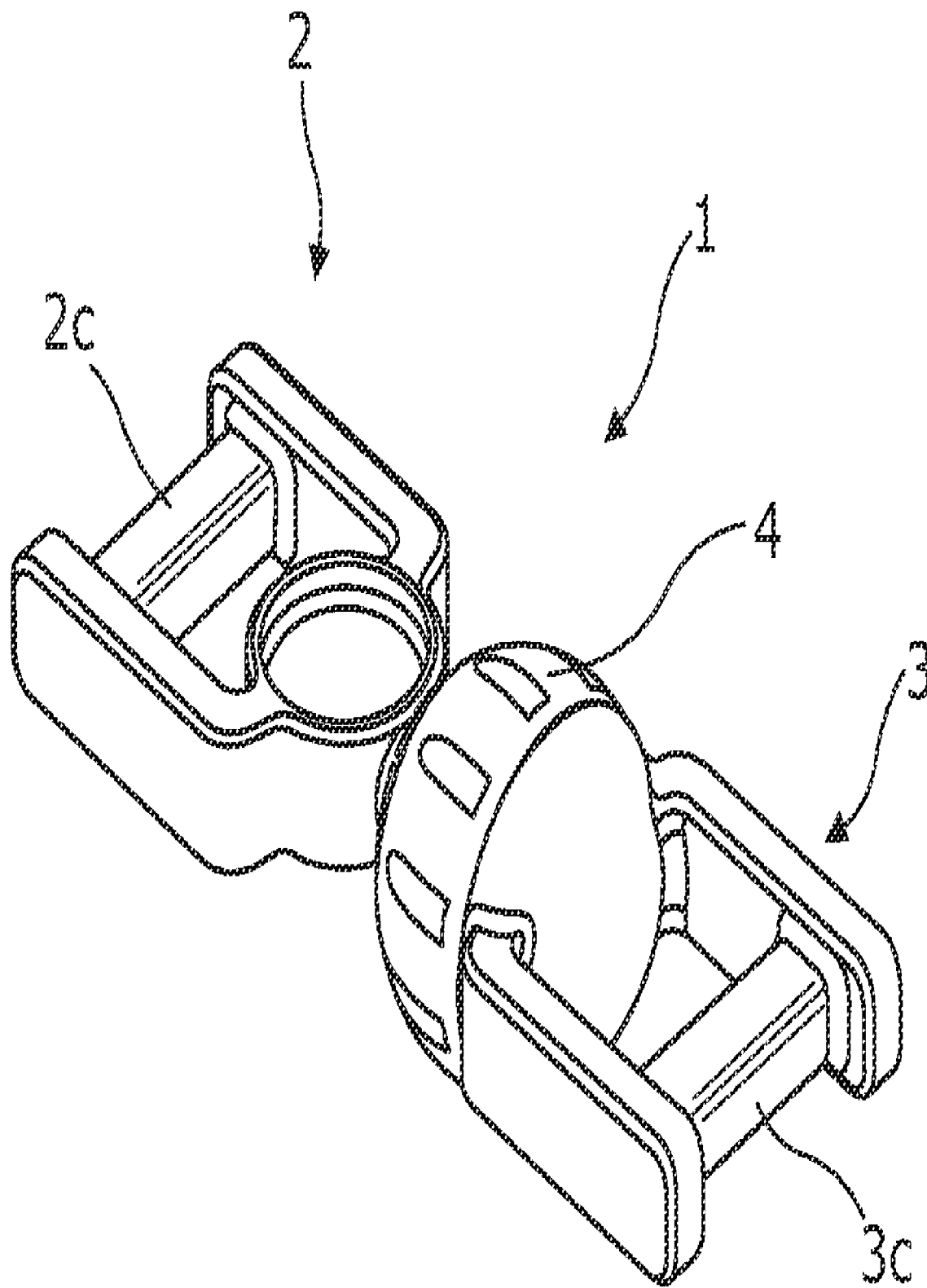


Figure 1