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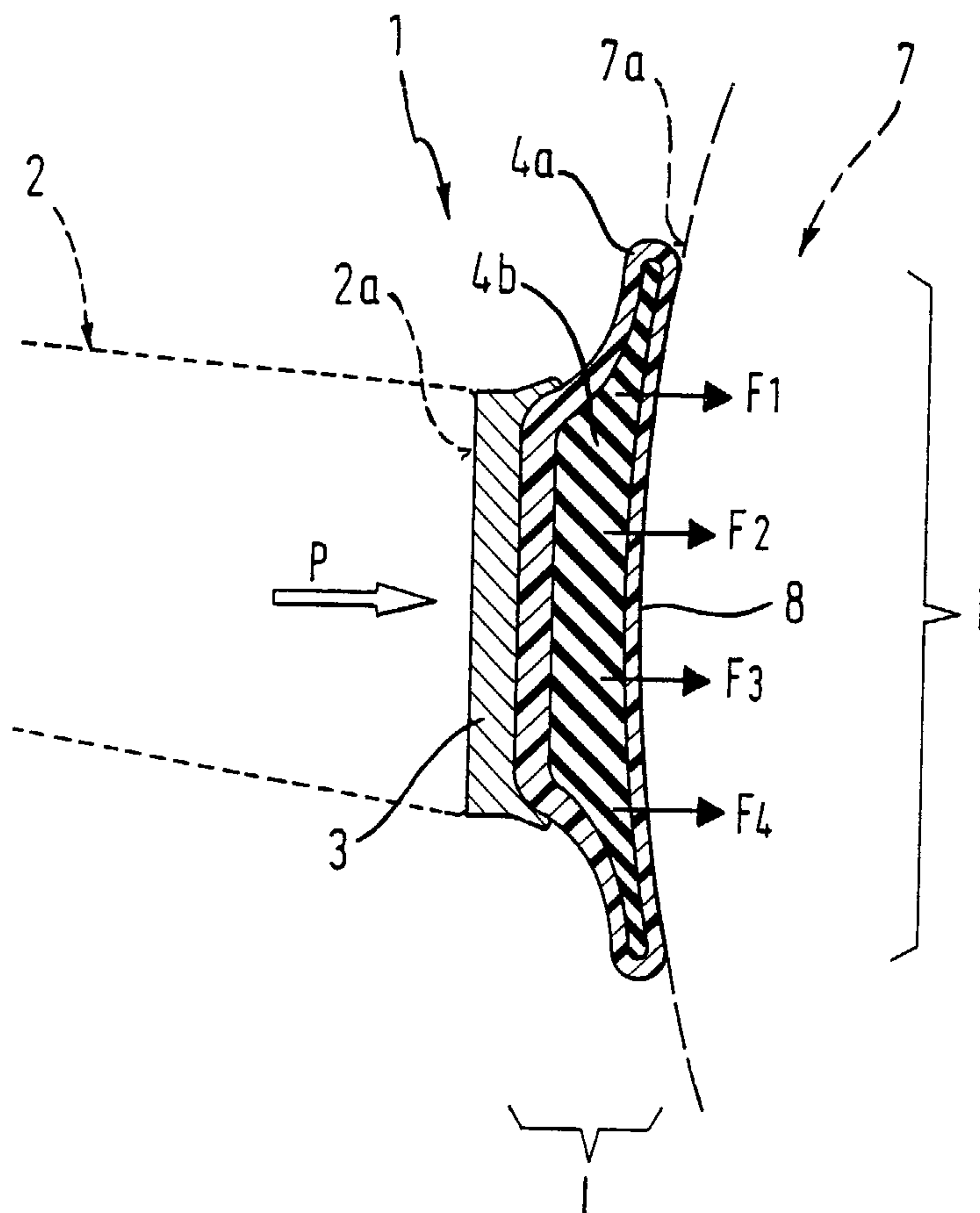
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[Fortsetzung auf der nächsten Seite]

(54) Title: RECOIL BUFFER

(54) Bezeichnung: RÜCKSTOSS-DÄMPFVORRICHTUNG



(57) Abstract: The invention relates to a recoil buffer (1) that can be mounted and/or is mounted on a small arm. Said recoil buffer (1) is designed in such a manner that the effective surface (8) thereof substantially enlarges from a first state of the recoil buffer (1) in which it is forced against the body (7) of a marksman during leveling to a second state during shooting.

(57) Zusammenfassung: Die Erfindung betrifft eine Rückstoß-Dämpfvorrichtung (1), welche an eine Handfeuerwaffe anbringbar ist und/oder welche an einer Handfeuerwaffe angebracht ist, wobei die Dämpfvorrichtung (1) so ausgestaltet ist, daß sich deren Wirkfläche (8) - zwischen einem ersten Zustand der Vorrichtung (1), bei welchem diese beim Anlegen der Waffe gegen den Körper (7) eines Schützen gedrückt wird, und einem zweiten Zustand bei der Schußabgabe - stark vergrößert.

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Zur Erklärung der Zweibuchstaben-Codes und der anderen Abkürzungen wird auf die Erklärungen ("Guidance Notes on Codes and Abbreviations") am Anfang jeder regulären Ausgabe der PCT-Gazette verwiesen.

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Recoil Pad Device

The invention concerns a recoil pad device which may be attached to a firearm and/or which has been attached to a firearm.

Firearms release significant recoil forces upon firing. These forces accelerate the weapon opposite the firing direction, i.e. toward the body of the shooter. This can lead to the weapon striking the body, which causes significant pain. To prevent this pain, the shooter presses the weapon against his body when aiming, specifically against the shoulder.

In order to decrease the recoil forces released against the body of the shooter, it has been proposed that the weapon housing be provided with a recoil pad device. This device will be situated between the body of the shooter and the weapon housing when aiming the weapon and will absorb a portion of the energy released from the recoil.

For example, the recoil pad device described in DE-T2 694 04 0180 is created in the form of a pocket that is affixed to the shoulder piece of a rifle. The pocket consists of a material that is only slightly, or not at all, flexible, e.g. made of cloth, and is filled with viscoelastic rubber.

A recoil pad device is known from US 4.683.671 that is fastened to a rifle and encompasses an elastic exterior casing that has an essentially square cross-section. The exterior casing is filled with a shock absorbing material.

The goal of the invention is to further develop the known recoil pad devices.

The invention achieves this goal through the object of claim 1. Accordingly, a recoil pad device that may be attached to firearm and/or has been attached to a firearm is arranged in such a way that the working surface – between a first condition of the device in which the surface is pressed against the body of the shooter when aiming the weapon, and a second condition upon firing – is greatly increased.

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FR 2 167 317 shows a recoil pad for a rifle stock in Fig. 10 that has a rubber cap that creates pliability in the blank spaces in the shooting direction upon firing the weapon. The associated resting surface on the shoulder of the shooter, the working surface, barely increases from this process.

The same applies to US 2 438 142 in which the recoil pad is created by an air pillow, which is, however, enclosed by a stiff casing that sharply restricts the increase in the working surface.

Advantageous arrangements of the invention are defined in the sub-claims.

The term "working surface" will be generally understood here as the part of the exterior surface of the recoil pad device that is touching the body of the shooter when aiming the weapon and upon subsequent firing of the weapon, in particular the surface portion over which the recoil forces are conducted from the pad device outward into the body of the shooter.

For example, the working surface can be that portion of the pad device surface that touches the shoulder, the cheek or the upper arm of the shooter upon aiming and subsequent firing of the weapon (e.g. when the device is attached to the shoulder piece of a rifle). It is also conceivable, for example, that the working surface is that portion of the exterior surface of the device that touches the palm of the shooter (e.g. when the device is attached to the grip of a pistol).

The invention is based on the following basic ideas: the pad device is arranged in such a way that its working surface – between a first condition of the device

where this surface is pressed against the body of the shooter when aiming the weapon, and a second condition upon subsequent firing of the weapon – is greatly increased. This causes the recoil force on the body generated upon firing to be distributed across a greater surface area. This decreases the pressure that is exerted against the body upon recoil of the weapon; firing the weapon will be perceived as "more pleasant" and less painful. It is advantageous when the recoil force is distributed in an essentially even manner over the total working surface to the body of the shooter.

It is especially advantageous to arrange the pad device in such a way that its working surface increases by more than 15%, in particular by more than 25%, especially preferable by more than 35% or by more than 50% or 75%. Such a significant increase in the working surface will bring about a corresponding decrease in recoil pressure.

The device can, for example, be formed integrally and be made of elastic material.

It is especially advantageous for the device to have an exterior casing. This will preferably be made of an elastic material. It is especially advantageous if the exterior casing is finished using an elastomer, i.e. a material with elasticity similar to rubber, such as natural rubber, chlorine rubber, polybutadiene, polyurethane, or silicone rubber. Elastomers stretch when exposed to a pulling force up to more than double the initial length. At greater flexibility, they have a high tensile strength and stiffness and hold their original shape after stretching. The exterior casing of the pad device will preferably be configured in such a way that it will stretch by more than 15%, especially advantageous by more than 30% or 50%.

Preferably the exterior casing will be filled with a shock-absorbing material. This will convert a portion of the recoil energy to heat. An elastomer, such as rubber, can be used as a shock-absorbing material in compact or non-compact form, for example (e.g. foamed or equipped with a honeycombed structure). It is advantageous to fill the exterior casing with a number of small absorption elements, e.g. filled with rubber, that will move relative to each other upon firing the weapon.

The recoil pad device can be attached to a firearm, e.g. a rifle, a machine gun, a pistol or an automatic pistol. It is advantageous to fasten the device to the shoulder piece, e.g. on a rifle, or on the grip of a pistol.

Particularly advantageous is the carrier element on the recoil pad device that is used to attach the device to the firearm. Preferably the connection between the weapon and the device, in particular between the weapon and the carrier element, may be disconnected. The disconnectable connection can be arranged, for example, as a resting connection. For example, the pad device can be formed in such a way that it can be attached to one of several identical firearms. A formation in which the device can be attached to one of several firearms of different types is advantageous, e.g. to different rifles.

In an alternative configuration, the pad device can also be connected permanently to the weapon, e.g. welded or riveted.

The invention will now be explained in greater detail using execution examples and the attached illustration. These illustrations show:

- Fig. 1 a cross-section through a recoil pad device according to an execution example of the invention in question at an initial unloaded condition;
- Fig. 2 the pad device shown in Fig. 1 in a second condition in which a shooter is pressing the device against his shoulder when aiming the weapon;
- Fig. 3 the device shown in Fig. 1 and 2 in a third condition in which a shot is being fired;
- Fig. 4 a lengthwise cross-section through the pad device in the condition shown in Fig. 1;
- Fig. 5 the working surface of the pad device in the second condition shown in Fig. 2 in which the surface is pressed against the shoulder of a shooter when aiming a weapon; and
- Fig. 6 the working surface of the pad device in the third condition shown in Fig. 3 in which a shot is being fired.

Fig. 1 shows a cross section through a recoil pad device 1 according to an execution example of the invention in question in an initial, unloaded condition.

The pad device 1 has a carrier plate 3 made of metal or synthetic material on its front end (displayed on the left in the illustration). This may be rested or screwed on the back end surface 2a of a shoulder piece 2 of a weapon (displayed with hatch lines in the illustration). From the back exterior edge of the carrier plate 3 outward, displayed on the right in the illustration, there is a groove 6. This groove is configured integrally with the carrier plate 3 and tapers toward the back and is angled against the exterior surface 3c of the carrier plate 3 outward.

The pad device 1 also has a pad element 4, which consists of an elastomer element 4a and a shock-absorbing element 4b. The elastomer casing 4a has an even thickness of approximately 0.5

cm and encases the shock-absorbing element 4b. The interior surface of the casing 4a and the exterior surface of the element 4b come into contact with each other and are connected in contact with each other. The shock-absorbing element 4b is configured integrally and consists of shock-absorbing material, rubber in this case. The front end surface of the elastomer casing 4a is glued or sprayed on to the back end surface 3a of the carrier plate 3 and the interior surface of the groove. The exterior contours of the elastomer casing 4a and the shock-absorbing element 4b are essentially square with rounded corners and exterior edged that bow slightly outward in the unloaded condition shown in Fig. 1 in the cross-section. In the unloaded condition, the pad element 4 has a length l of approximately 6 cm, a height h of approximately 8 cm and a width b of approximately 4 cm as shown in Fig. 4.

The elastomer casing 4a and the shock-absorbing element 4b are essentially oval as shown in the lengthwise cross-section in Fig. 4. The exterior contour of the elastomer casing 4a essentially corresponds in shape and size to the groove 6 of the carrier plate 3 shown in Fig. 1 and the back end surface 2a of the rifle shoulder piece 2.

Before using the rifle the pad device 1 is rested on the back end surface 2a of the rifle shoulder piece 2, i.e. connected solidly with the rifle (Fig. 2) using a resting connection (not displayed). Then the shooter aims the rifle and thereby presses the pad device 1 back against his shoulder 7, i.e. in the direction of an arrow P. This slightly distorts the elastomer casing 4a and the shock-absorbing element 4b. The pad element 4 then has a length l of approximately 5 cm and the back end surface 4a of the pad element 4 adjusts ergonomically to the front shoulder surface 7a.

Upon aiming the weapon, the working surface 8, i.e. in this example the portion of the exterior surface of the elastomer casing 4a touching front shoulder surface 7a of the shooter, has a height l of approximately 7 cm and, according to Fig. 5, a width c of approximately 3 cm. The exterior contour of the working surface 8 is essentially oval. Due to the aforementioned ergonomic adjustment of the pad element 4, the working surface 8 is bowed slightly inward (see Fig. 2).

Fig. 3 shows the pad device 1 displayed in Fig. 1 and 2 in a third condition in which a shot is made from the rifle. The pad device 1 is pressed against the shoulder 7 of the shooter in the

direction of the arrow p – significantly stronger than when aiming – by the strong recoil force occurring when the shot is made. Here the elastomer casing 4a and the shock-absorbing element 4b are strongly distorted. The pad element 4 then only has a length of approximately 2 cm (note: Fig. 3 displays the condition of maximum distortion of the pad element 4).

The distortion of the pad element 4 brings about the following effects: first a portion of the energy occurring from the recoil is converted into heat, and thereby decreases the recoil force being exerted on the shoulder 7 of the shooter.

Secondly, the working surface 8, i.e. in this case the portion of the exterior surface of the elastomer casing 4a that touches the front shoulder surface 7a of the shooter, increases greatly. This is then, for example, clearly greater than the back end surface 2a of the rifle shoulder piece 2. In this case it has a height I upon firing of approximately 12 cm and, according to Fig. 6 a breadth c of approximately 5 cm.

The exterior contour of the working surface 8 remains essentially oval. As is shown in Fig. 2 and 3, the distortion of the pad element 4 is so strong that parts of that section of the pad element exterior surface, which at first do not point backward (i.e., for example upward or downward or to the side), form a portion of the working surface 8 upon firing the weapon.

According to Fig. 3 the pad element 4 is configured in such a way that the recoil force (remaining after padding by the pad element 4) is in essence distributed equally over the entire working surface 8 and conducted into the shoulder 7. For example, the forces F2 and F3 at work in the central area of the working surface 8 at the front shoulder surface 7a are essentially equal in magnitude as the forces F1 and F4 that work on the upper and lower end area of the working surface 8 and the front shoulder surface 7a (similarly, this also applies to forces working on the left and right end areas of the working surface 8 at the shoulder that are not illustrated compared to the other forces affecting the remaining working surface areas).

Distribution of the recoil force over a relatively large working surface 8 upon firing the weapon will result in significantly less pressure on the shoulder of the shooter compared to previous rifles.

After firing the weapon, the pad element will return to the condition shown in Fig. 2. An engaging mechanism (not displayed) will give the shooter the option of disconnecting the resting connection between the shoulder piece 2 and the carrier plate 3 and the pad device 1 can therefore be taken off of the rifle and exchanged, if necessary.

What is claimed is:

1. A recoil pad device suitable for attachment to a firearm, said recoil pad comprising a working surface, said working surface having a first configuration in which the recoil pad device is pressed against a shooter's body for aiming the weapon, and said working surface being increased in a second configuration upon firing the firearm.
2. The device as claimed in claim 1, wherein said working surface is increased by more than 15%.
3. The device as claimed in claim 1, wherein said working surface is increased by more than 25%.
4. The device as claimed in any one of claims 1 to 3, including a pad element having an exterior casing comprising an elastic material.
5. The device as claimed in claim 4, wherein said elastic material comprises an elastomer.
6. The device as claimed in any one of the claims 4 to 5, wherein said exterior casing includes a shock-absorbing material.
7. A firearm having a recoil pad device, said recoil pad being attached to the firearm, and comprising: a working surface, said working surface having a first configuration in which the recoil pad device is pressed against a shooter's body for

aiming the weapon, and said working surface being increased in a second configuration upon firing the firearm.

8. The firearm as claimed in claim 7, wherein said working surface is increased by more than 15% in said second configuration.
9. The firearm as claimed in claim 8, wherein said working surface is increased by more than 25% in said second configuration.
10. The firearm as claimed in any one of claims 7 to 9, including a pad element having an exterior casing comprising an elastic material.
11. The firearm as claimed in claim 10, wherein said elastic material comprises an elastomer.
12. The firearm as claimed in claim 10 to 11, wherein said exterior casing includes a shock-absorbing material.
13. The firearm as claimed in claim 7, wherein said recoil pad device includes a carrier element for attaching said recoil pad device to the firearm.
14. The firearm as claimed in claim 7 or 13, wherein said carrier element comprises a disconnectable connection mechanism for said recoil pad and the firearm.
15. The firearm as claimed in claim 14, wherein the disconnectable connection is configured as a resting connection for coupling said recoil pad device.

Fig. 1

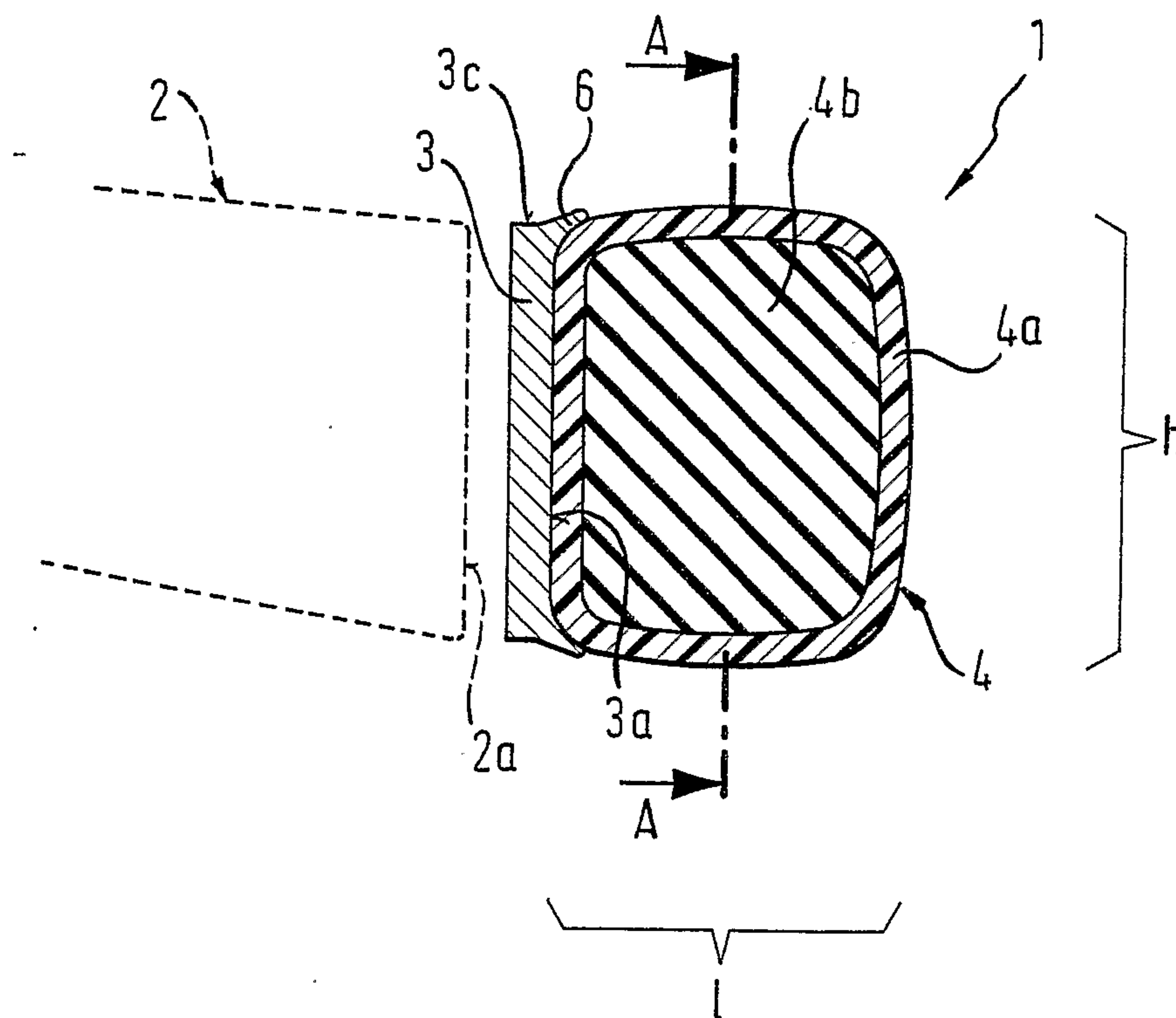


Fig. 2

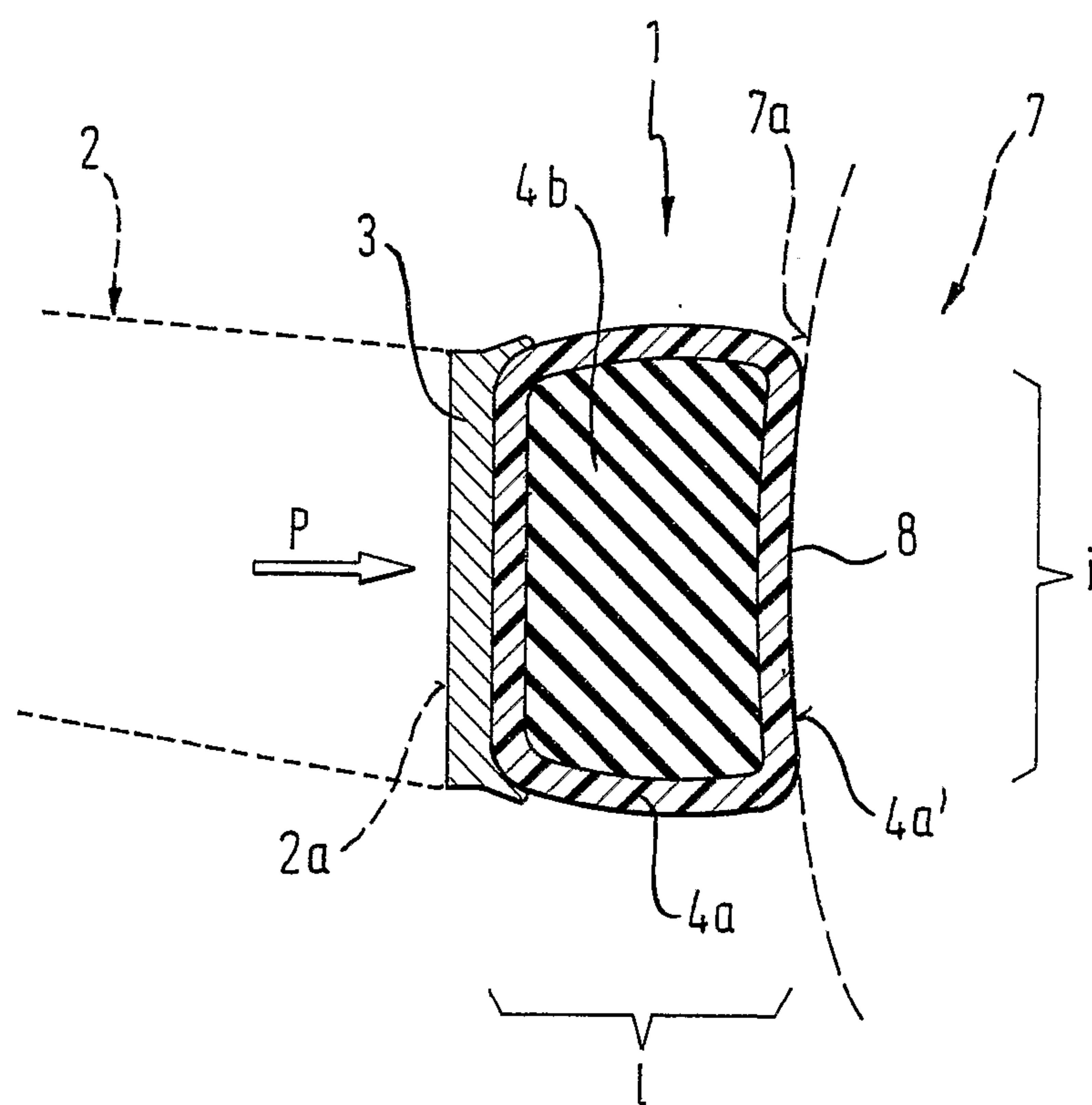


Fig. 3

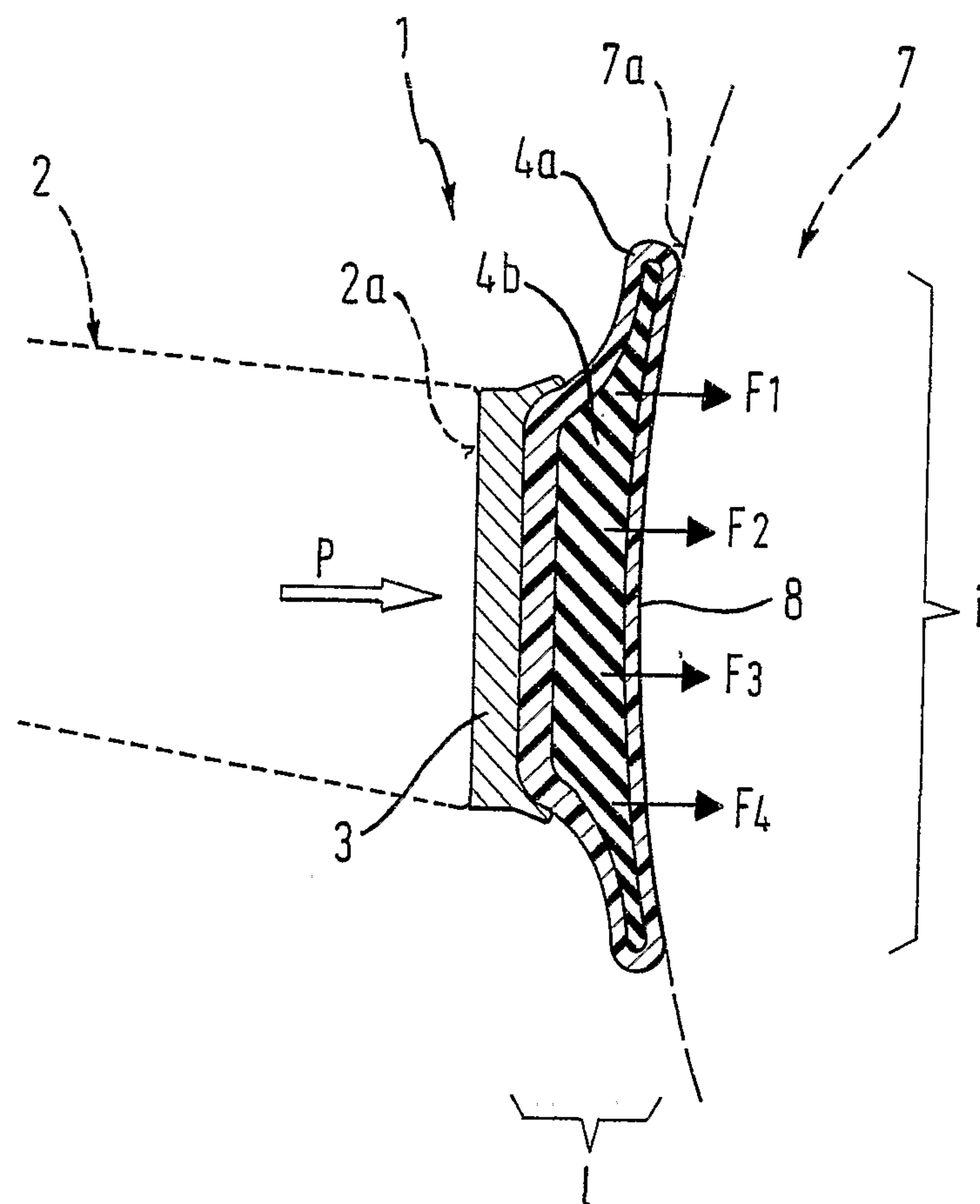


Fig. 4
(A - A)

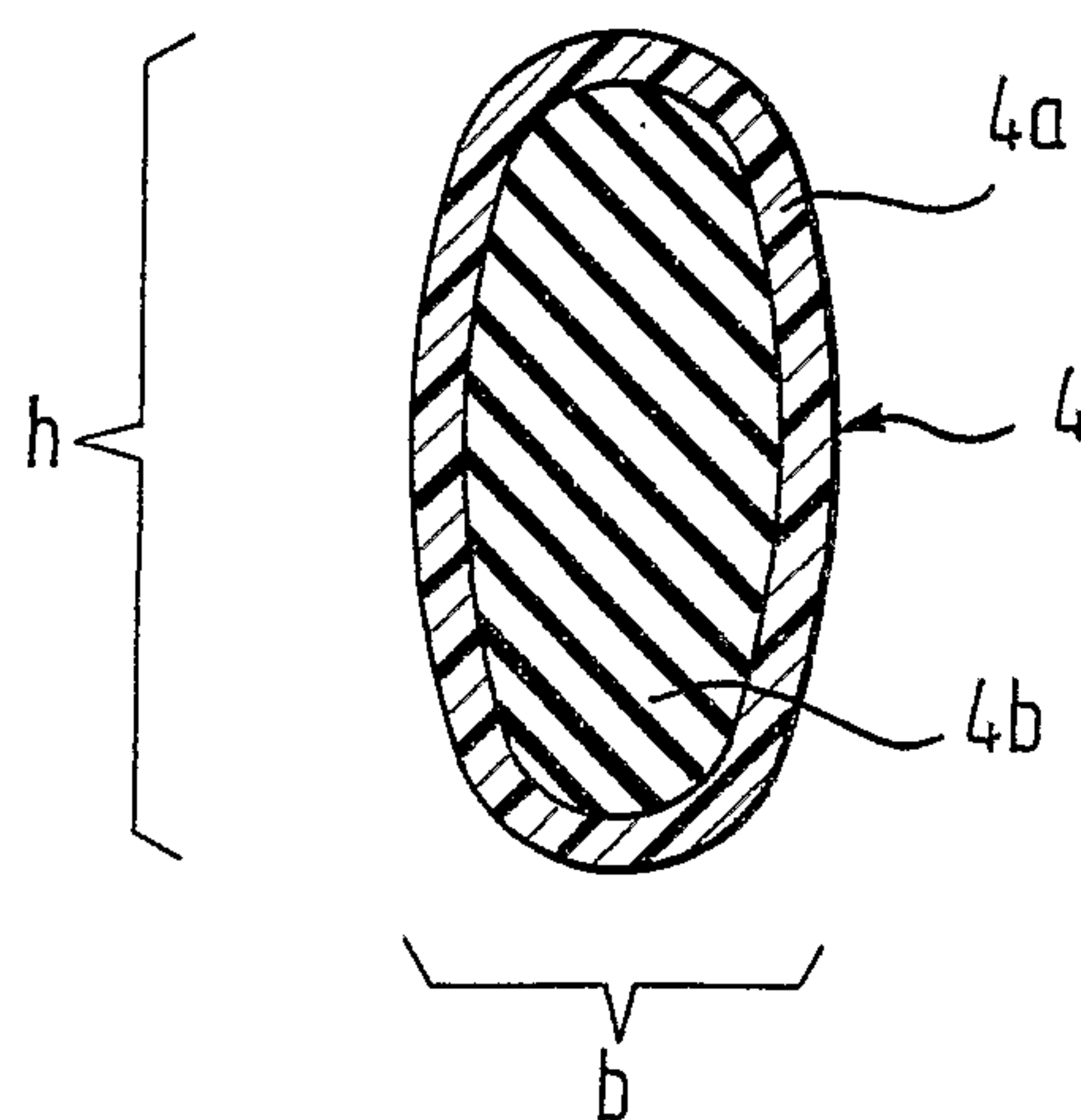


Fig. 5

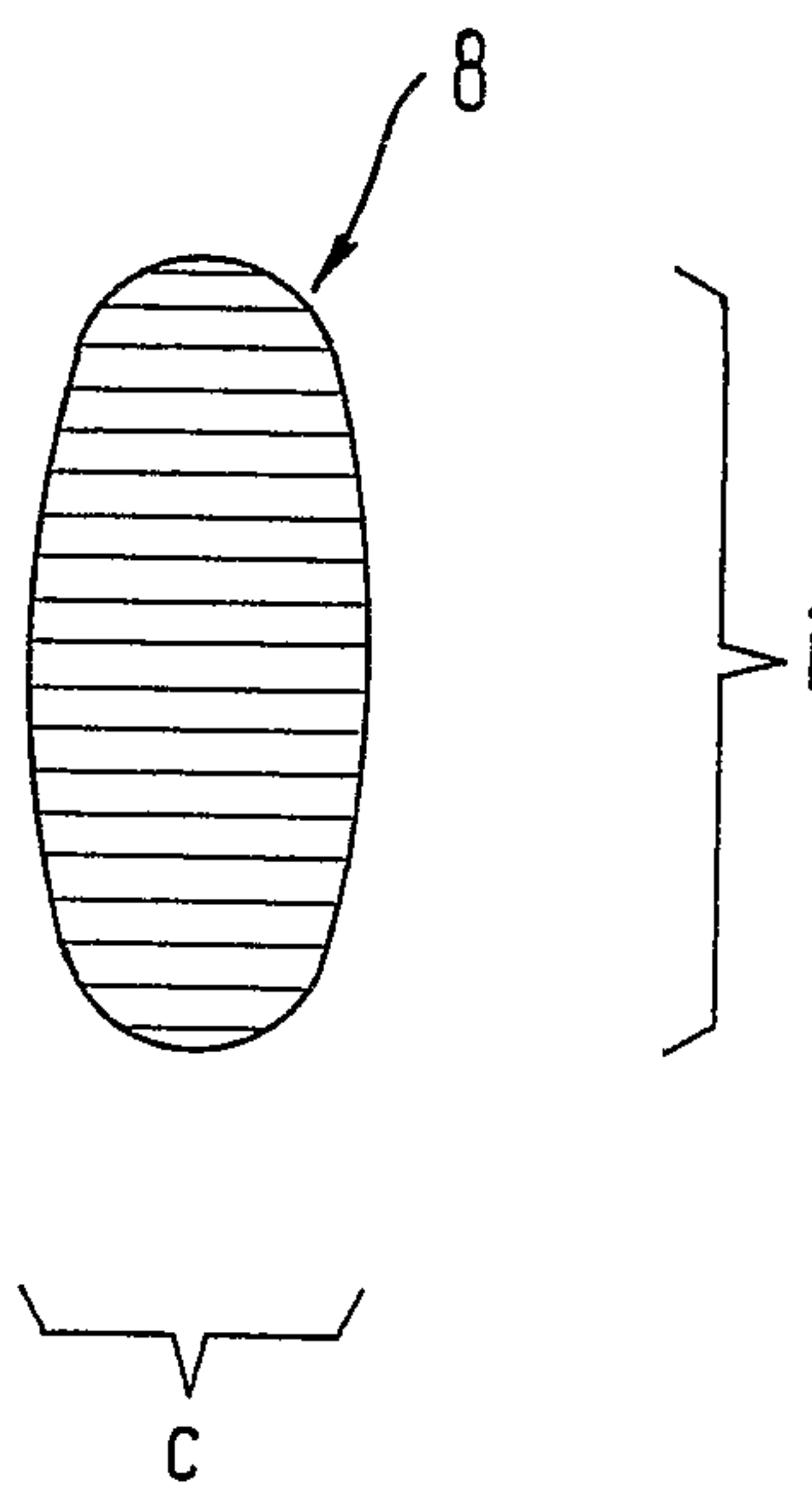


Fig. 6

