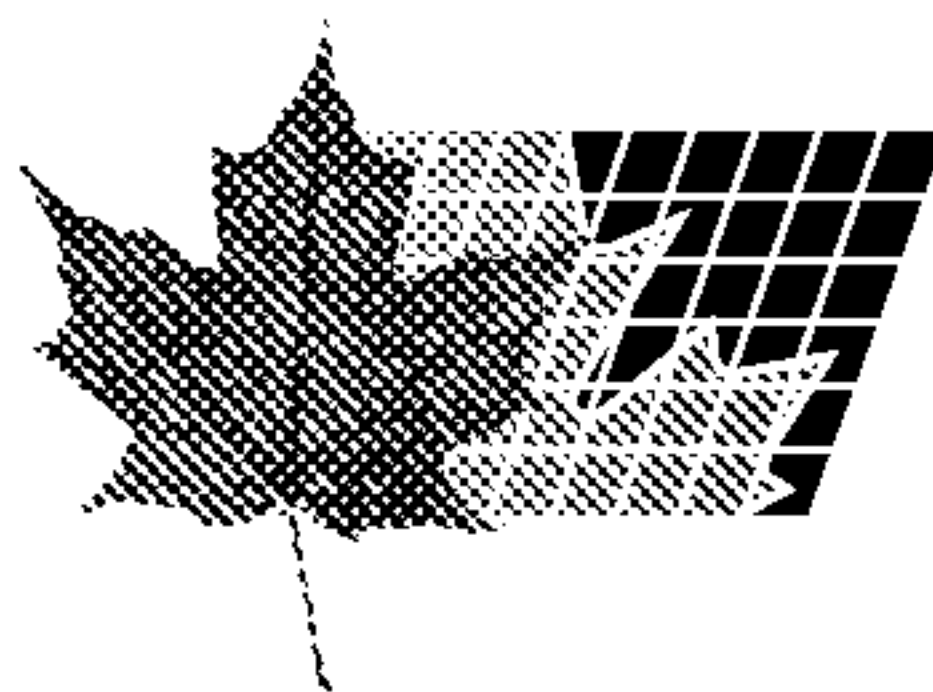
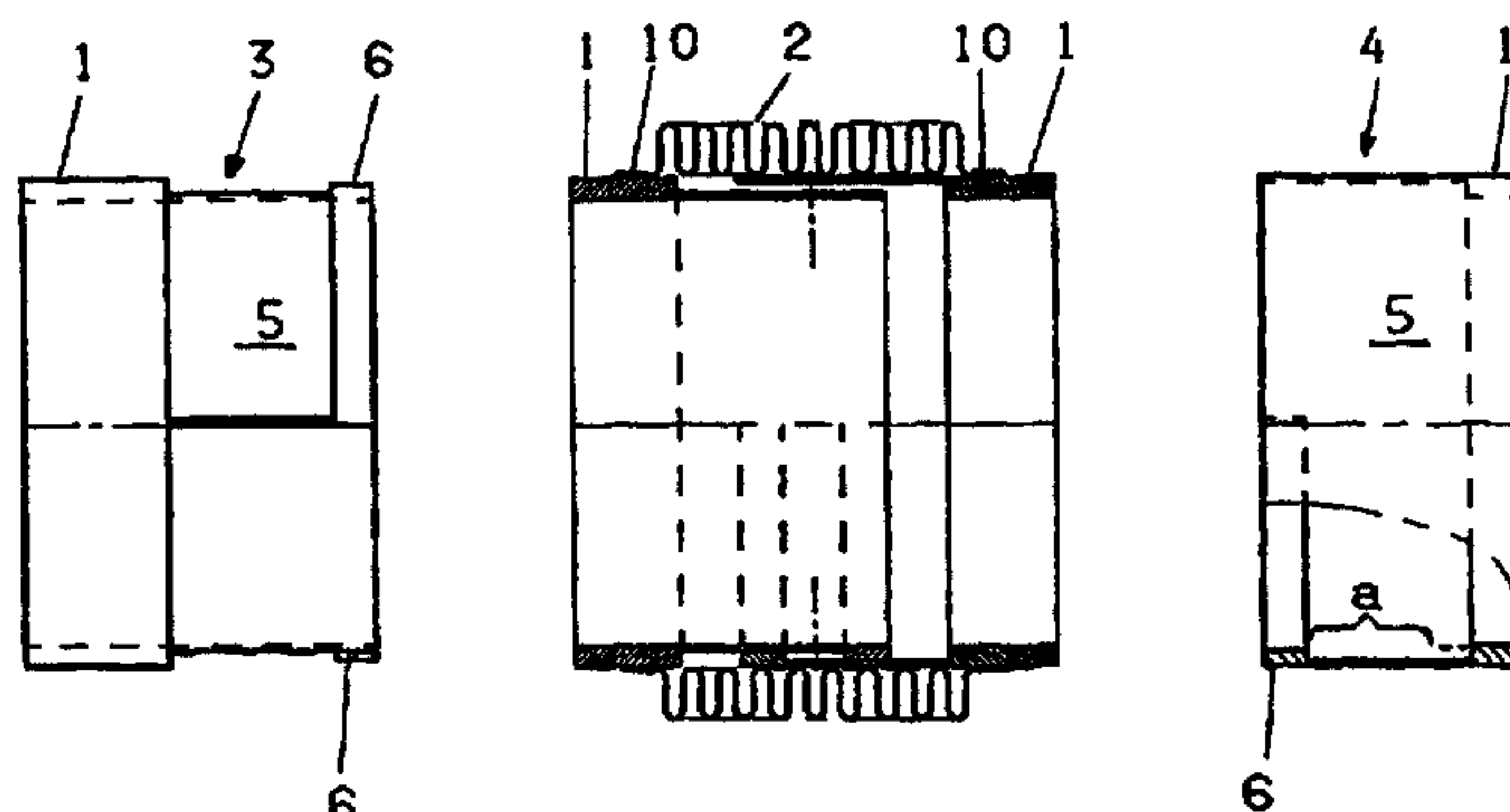




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(54) **COMPENSATEUR AXIAL**
(54) **AXIAL COMPENSATOR**



(57) Compensateur axial destiné notamment à des conduites appropriées pour le transport de milieux gazeux et liquides, comprenant essentiellement au moins un compensateur à tube ondulé disposé entre deux tubulures de conduites réalisées sous forme d'extrémités soudées, et munies de guides tubulaires intérieurs correspondants s'emboîtant entre eux. En vue d'équilibrer la conduite lors de variations de longueur consécutives, par exemple, à des efforts de compression ou de traction, ainsi que pour permettre des déplacements rigoureusement définis, même à de faibles contraintes de transfert, les guides couissant mutuellement (3, 4) sont munis chacun à leurs extrémités, d'au moins deux tenons d'écartement en forme de brides (6), opposés l'un à l'autre. Les tenons d'écartement (6) présentent un angle périphérique (β) inférieur aux ouvertures (7) prévues entre les tenons d'écartement (6), cependant que lesdits tenons, amenés par rotation en leur position finale, de manière correspondant à leur angle périphérique (β), délimitent le parcours de déplacement (a).

(57) The invention relates to axial compensators for use especially in pipes suitable for carrying gaseous and liquid media, essentially comprising at least one compensator made of corrugated tube and arranged between two connecting sleeves embodied as welded ends and having internal, tubular, corresponding guide parts which can slide into each other and be connected to the connecting sleeves. To alleviate pipe load during variations in length, for example because of compressive or tensile stress, and to allow for precisely definable movements even with small transfer forces the two guide parts (3, 4) which can be slid into each other at each end have at least two flange-like spacing studs (6) situated opposite each other, which spacing studs (6) have a smaller angle at circumference (β) than the openings (7) provided for between the spacing studs (6) and said spacing studs (6), which are brought into their final position by rotation in accordance with their angle at circumference (β), limit the length of the sliding run (a).



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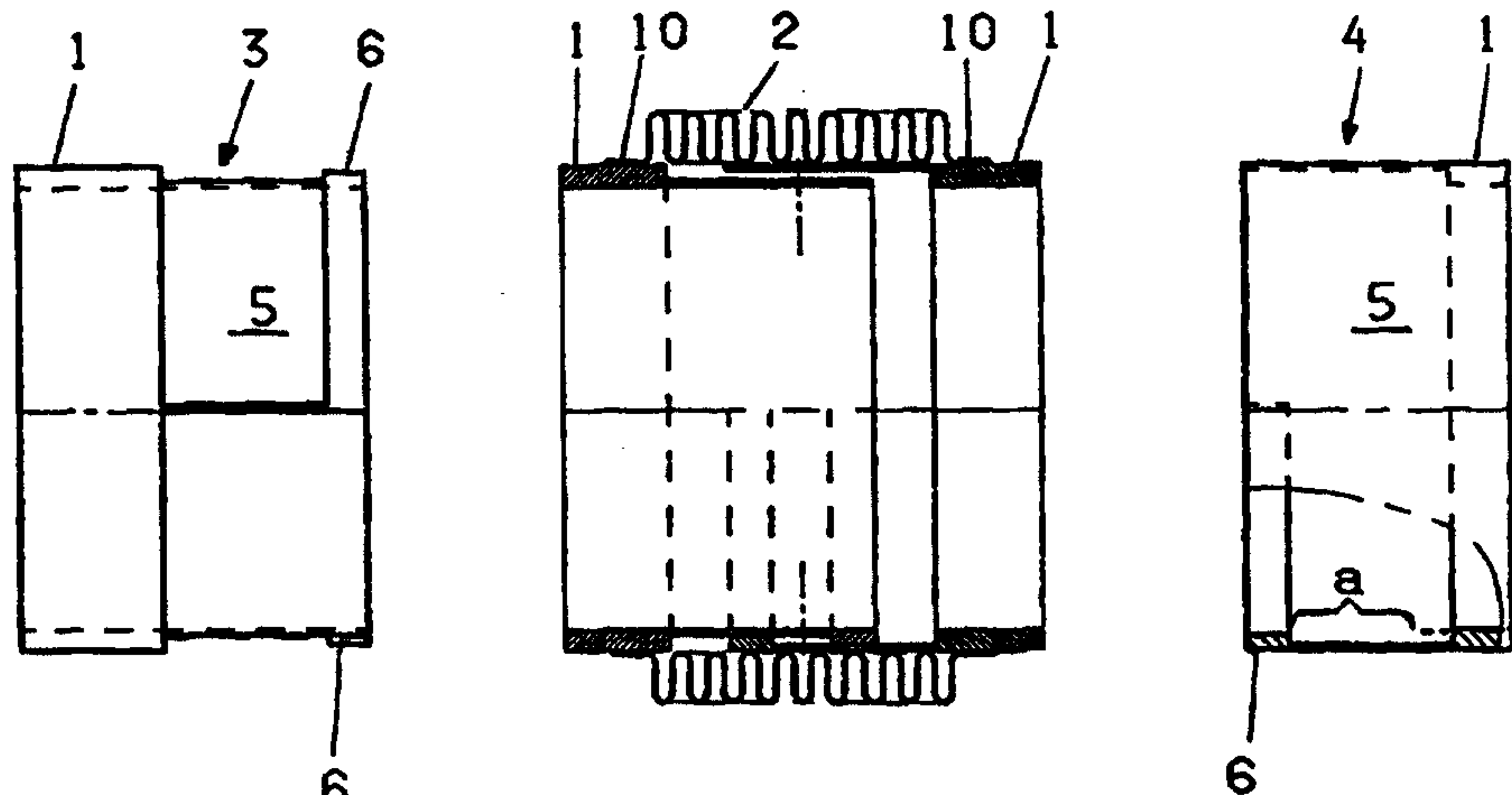
(54) Title: AXIAL COMPENSATOR

(54) Bezeichnung: AXIALKOMPENSATOR

(57) Abstract

The invention relates to axial compensators for use especially in pipes suitable for carrying gaseous and liquid media, essentially comprising at least one compensator made of corrugated tube and arranged between two connecting sleeves embodied as welded ends and having internal, tubular, corresponding guide parts which can slide into each other and be connected to the connecting sleeves. To

alleviate pipe load during variations in length, for example because of compressive or tensile stress, and to allow for precisely definable movements even with small transfer forces the two guide parts (3, 4) which can be slid into each other at each end have at least two flange-like spacing studs (6) situated opposite each other, which spacing studs (6) have a smaller angle at circumference (β) than the openings (7) provided for between the spacing studs (6) and said spacing studs (6), which are brought into their final position by rotation in accordance with their angle at circumference (β), limit the length of the sliding run (a).



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AXIAL COMPENSATOR

5 The invention relates to an axial compensator, in particular for piping systems conveying gaseous or liquid mediums, which is generally comprised of at least one corrugated compensator tube extending between two pipe sleeves formed as weld-connector ends and with telescoping, inner, tubular, and interfitting guides interconnecting the pipe sleeves.

10 In order to compensate for axially effective pipe deformations so-called axial compensators are built into a piping system. Among the known types are the stuffing-box type which can as a result of its construction permit considerable axial displacements but which at the same time seals poorly and only reacts and adjusts in response to considerable forces sufficient to overcome friction.

15 Smaller axial displacements are taken care of by corrugated compensator tubes with no internal guide. Such compensators are dangerous in that they can be kinked if not guided and supported perfectly.

20 In addition there are corrugated compensator tubes with internal guides wherein inner overlapping tubular extensions interconnect the connector sleeves inside the corrugated compensator tube and serve as an axial guide. The considerable disadvantage of compensators with internal guiding is that the guides do not limit inward or outward movement and in particular under large

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pressurization and correspondingly large movements the corrugated compensator tube can be destroyed by being stretched too much. This disadvantage can only be alleviated by the use of expensive devices built onto the outside of the corrugated tube compensator.

5 It is an object of the invention to provide an axial compensator that can be subjected to high pressures and substantial axial movements, which is of simple and inexpensive construction, and which in addition allows relief in the piping system of even very small axial forces.

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According to British 1,531,792 a corrugated compensator tube is provided with the above-described internal guide system wherein the guide overlap and are connected together and form a guide with the weld-on ends. In order to limit the slide travel there is an outer protective casing with a slide ring that is provided with bolts guided in slots. Such a system requires in addition to the internal guide system an extremely expensive outer guide for limiting the slide travel.

German utility model 86 32,567 describes various embodiments of axial compensators in which the necessary length limiter is connected with the inside protective tube. A radial flaring at the free end of the inner protective tube can move limitedly in a altered part of the cross section.

In addition to the high construction costs such corrugated tube compensators have the disadvantage that they cannot withstand substantial forces and are not intended for high pressures.

European 108,829 shows an axial compensator with at least one metallic cuff whose ends are each connected with a pipe section. The ends of the pipe sections have axially outwardly directed formations and cooperating seats. In order to make possible the necessary slide travel of the projections inside the seats one must complexly prepare the tube ends and go through a complicated assembly. Since the symmetrical or angularly distributed shapes on the tube ends cannot slide or fit within each other, it is necessary to eliminate a complete preassembly and to instead go to the expense of doing the final assembly at the site. The action of the

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corresponding shaped parts can only work when the parts are fitted together and soldered to the tube ends. The shaped parts then only form a guide which lies in the tube wall and that does not guide the parts safely.

5 It is an object of the invention to provide an axial compensator that can be subjected to high pressures and substantial axial movements, which is of simple and inexpensive construction, and which in addition allows relief in the piping system of even very small axial forces.

10 This object is achieved in that the telescoping guides are each provided at an end with at least two offset flange-like spacing noses, the spacing noses extending over a shorter arc than gaps formed between the spacing noses, and that the spacing noses are set by twisting through their arc in end positions limiting a
15 slide travel. In addition to the use of a compensator with a corrugated-tube hose the invention allows the ganging of several corrugated compensator tubes to compensate for substantial movements, the forces being transmitted by the various connections of the guides to each corrugated compensator tube. This reduces the
20 adjustment forces such that the movements are only applied to the acting corrugated compensator tubes. This thus reduces the load on the piping system.

 This object is achieved in that the telescoping guides are each provided at an end with at least two offset flange-like

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spacing noses, the spacing noses extending over a shorter arc than gaps formed between the spacing noses, and that the spacing noses are set by twisting through their arc in end positions limiting a slide travel. In addition to the use of a compensator with a

5 corrugated-tube hose the invention allows the ganging of several corrugated compensator tubes to compensate for substantial movements, the forces being transmitted by the various connections of the guides to each corrugated compensator tube. This reduces the adjustment forces such that the movements are only applied to the

10 acting corrugated compensator tubes. This thus reduces the load on the piping system.

The particular advantage of the guiding is that axial forces are compensated for and simultaneously the guides act as

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travel limiters. Such guides with limiters can be used anywhere where length changes, for instance caused thermally, have to be dealt with.

Particular embodiments of the pipe or tube elements carrying the guides are thus necessary when several corrugated compensator tubes are used to compensate for substantial slide travels. In addition to the pipe sleeves which are soldered into the piping system, intermediate elements in the form of guide or tube elements must be provided that have guides on both ends and that simultaneously are formed as weld-connector ends for connection to the individual corrugated compensator tubes. The telescoping guides thus must have spacing noses that are set according to the limits of slide travel. A substantial number of outer or inner spacing noses on the guides improved the axial transmission of forces. In order to be able to set the interengaging and relatively slidable guides to transmit all of the possible compression or extension, additional abutments are provided for limiting angular movement. In addition it is possible that each corrugated compensator tube be provided with a protective casing and even with sensors. In addition it is advantageous to provide the interengaging guides with seals as for example O-rings.

An example of the invention is shown in the drawing and more closely described in the following. There is shown in:

FIG. 1 an example of an axial compensator in section;

FIG. 2 an example of an outside guide element;

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FIG. 3 an example of an inner guide element; and

FIG. 4 a further example of an axial compensator with several corrugated compensator tubes and a considerable slide travel.

5 FIG. 1 shows a simple embodiment of an axial compensator in section along with the corresponding guides 3 and 4. The compensator is comprised basically of a corrugated compensator tube 2 extending between two pipe sleeves formed as weld-connector ends 1. The corrugated connector tube 2 has welded-on rings 10 for
10 connection with the connector ends 1. The tubular elements functioning as guides 3 and 4 have adjacent the connector ends telescoping inner and outer tubes 5 whose ends are formed with flange-like spacing noses 6. The spacing noses 6 are on the outside of the inner guide element 3 and on the inside of the outer guide
15 element 4. The spacing noses 6 are as better shown in FIGS. 3 and 4 aligned with each other in the tubes 5 and the gaps 7 between the spacing noses 6 have a greater angular dimension than the spacing noses 6 which have an angular dimension β . The number of spacing noses that are set diametrically opposite each other on the
20 tubes 5 can be varied, axial stability increasing with the number.

 In order to assemble a compensator the inner guide element 4 is fitted into the outer guide element 3 and the two are relatively turned until the spacing nose 6 of the outer guide element 4 engages an abutment 11. The slide travel a is limited on
25 extension and contraction by the spacing noses 6 of the guide

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elements 3 and 4. FIG. 4 shows a further embodiment of an axial compensator in section which for example is comprised of five corrugated compensator tubes 2 and is intended to provide substantial slide travel to compensate for length changes. To this end pipe elements or tube sections 9 are used on all but the guide elements 3 and 4 connected to the weld connector ends 1 and serve not only to mount the corrugated compensator tubes 2 but also to guide telescopingly. The idea of the spacing noses 6 defining a slide travel a is employed in the same form.

10 The possibility of providing any number of corrugated compensator tubes allows the compensator to be set up for any necessary length change in the piping system.

15 The particular advantages of such an arrangement are the reduction of the compensation force so that the piping system is not excessively stressed.

 The above-mentioned protective casing can also surround the compensator on the outside and serve as an outside guide while simultaneously protecting the compensator from dirt.

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Reference character list

	1	weld-connector end
	2	corrugated compensator tube
	3	guide
5	4	guide
	5	tube
	6	spacing nose
	7	space
	8	slide travel
10	9	guide element
	10	welded-on ring
	11	abutment
	a	slide travel

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Axial compensator

Patent claims

1. Axial compensator in particular for piping systems conveying gaseous or liquid mediums, which is generally comprised of at least one corrugated compensator tube extending between two pipe sleeves formed as weld-connector ends and with telescoping, inner, tubular, and interfitting guides interconnecting the pipe sleeves, characterized in that the telescoping guides (3 and 4) are each provided at an end with at least two radially projecting aligned flange-like spacing noses (6), the spacing noses (6) extending over a shorter arc β than gaps (7) formed between the spacing noses (6), and that the spacing noses (6) are set by twisting through their arc β in end positions limiting a slide travel (a).

2. The axial compensator according to claim 1, characterized in that the guides (3 and 4) each have on their ends a plurality of angularly uniformly spaced spacing noses (6) defining corresponding intervening gaps (7).

3. The axial compensator according to claim 1, characterized in that the corrugated compensator tube is surrounded by a protective casing.

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4. The axial compensator according to claim 1, characterized in that several aligned corrugated compensator tubes (2) are arranged between two pipe-sleeve ends (1), each corrugated compensator tube (2) having guides (3, 4, and 9) with relatively
5 slidable flange-like spacing noses (6).

5. The axial compensator according to claim 4, characterized in that when several corrugated compensator tubes (2) are arranged in a row the endwise tubular guide elements (9) with telescoping guides (3 and 4) are formed as weld-connector ends for
10 mounting the corrugated compensator tubes.

6. The axial compensator according to the preceding claims, characterized in that the guides (3 and 4) are provided with an abutment (11) limiting relative rotation.

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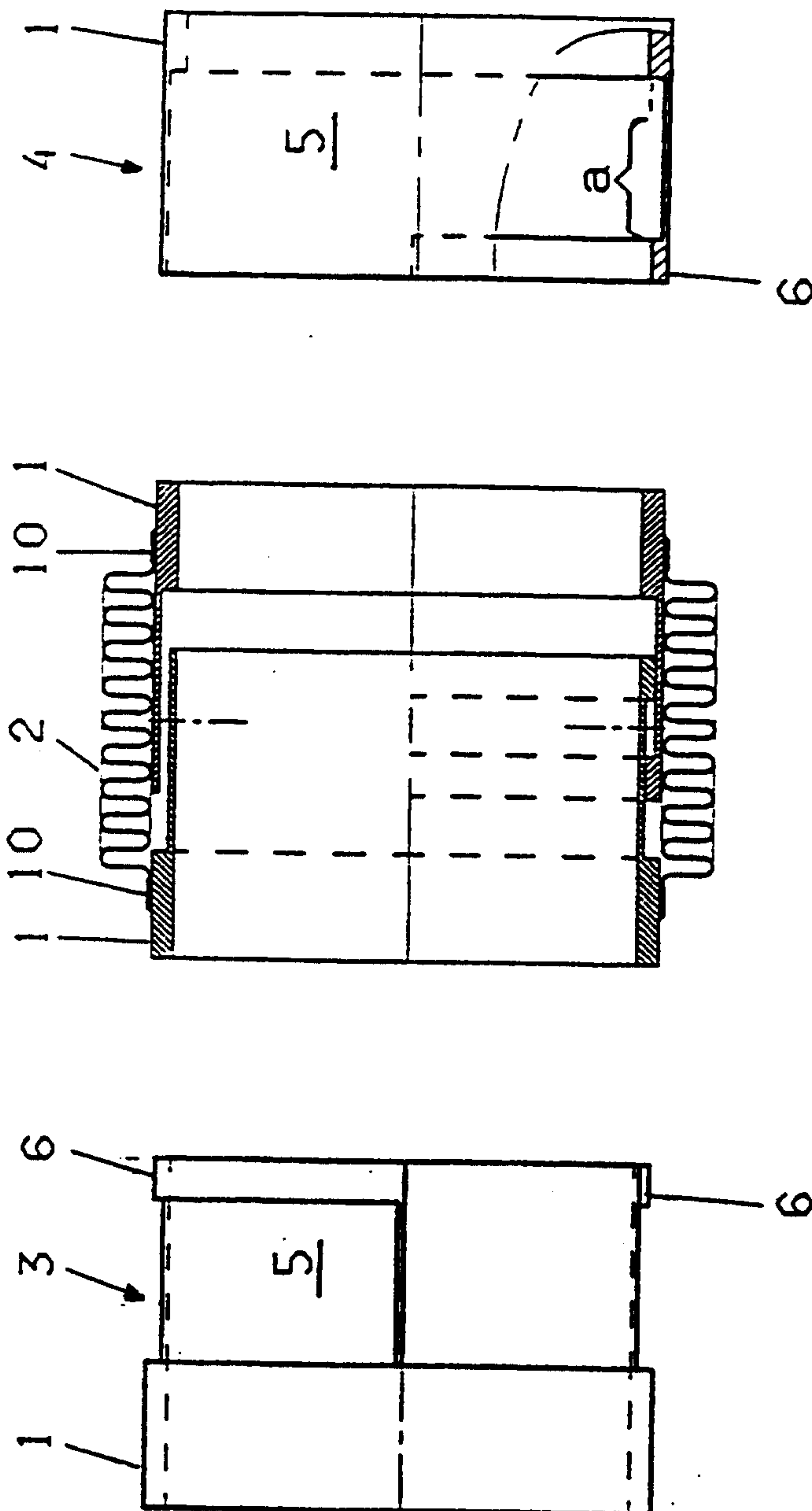


Fig. 1

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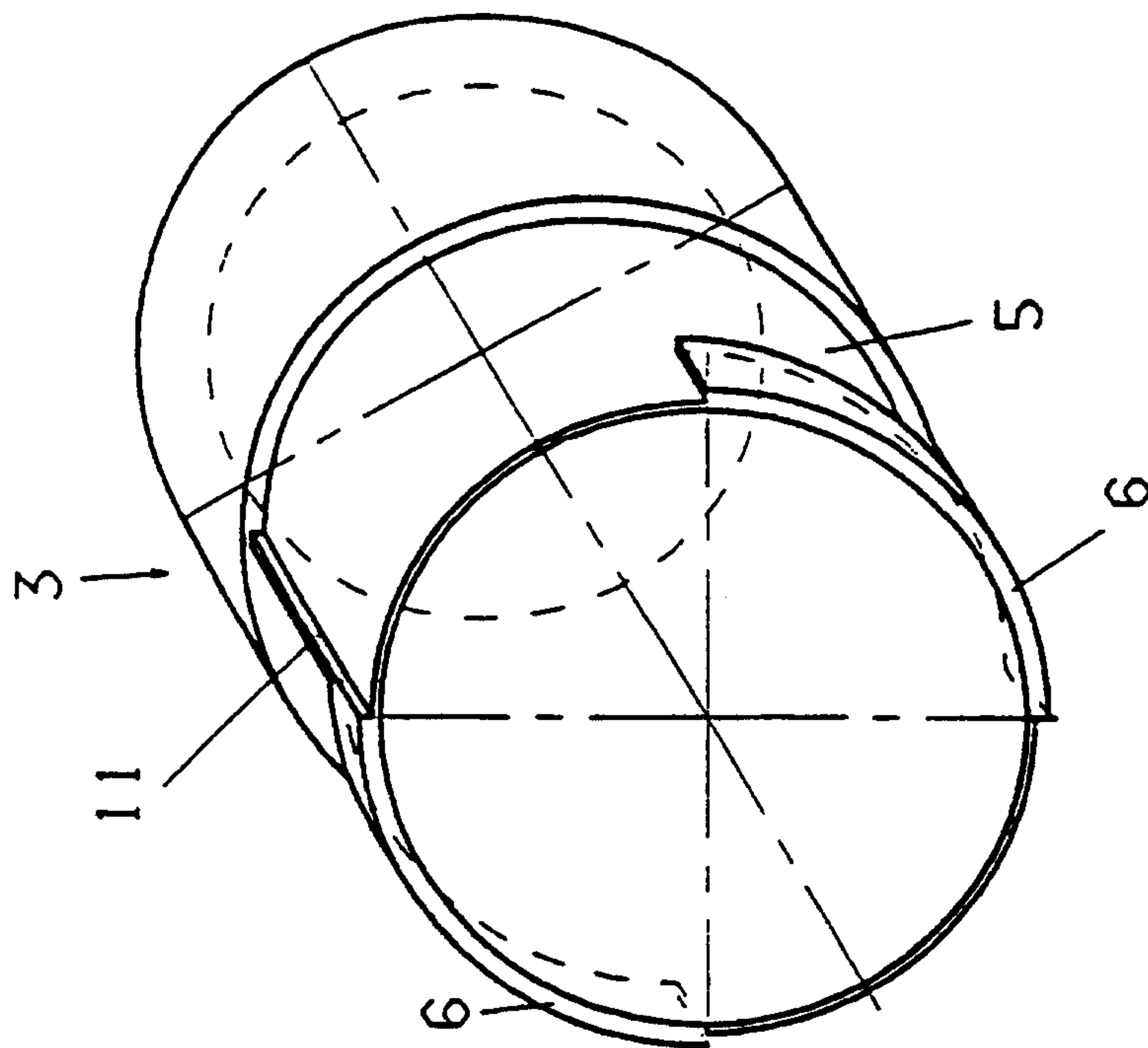


Fig. 3

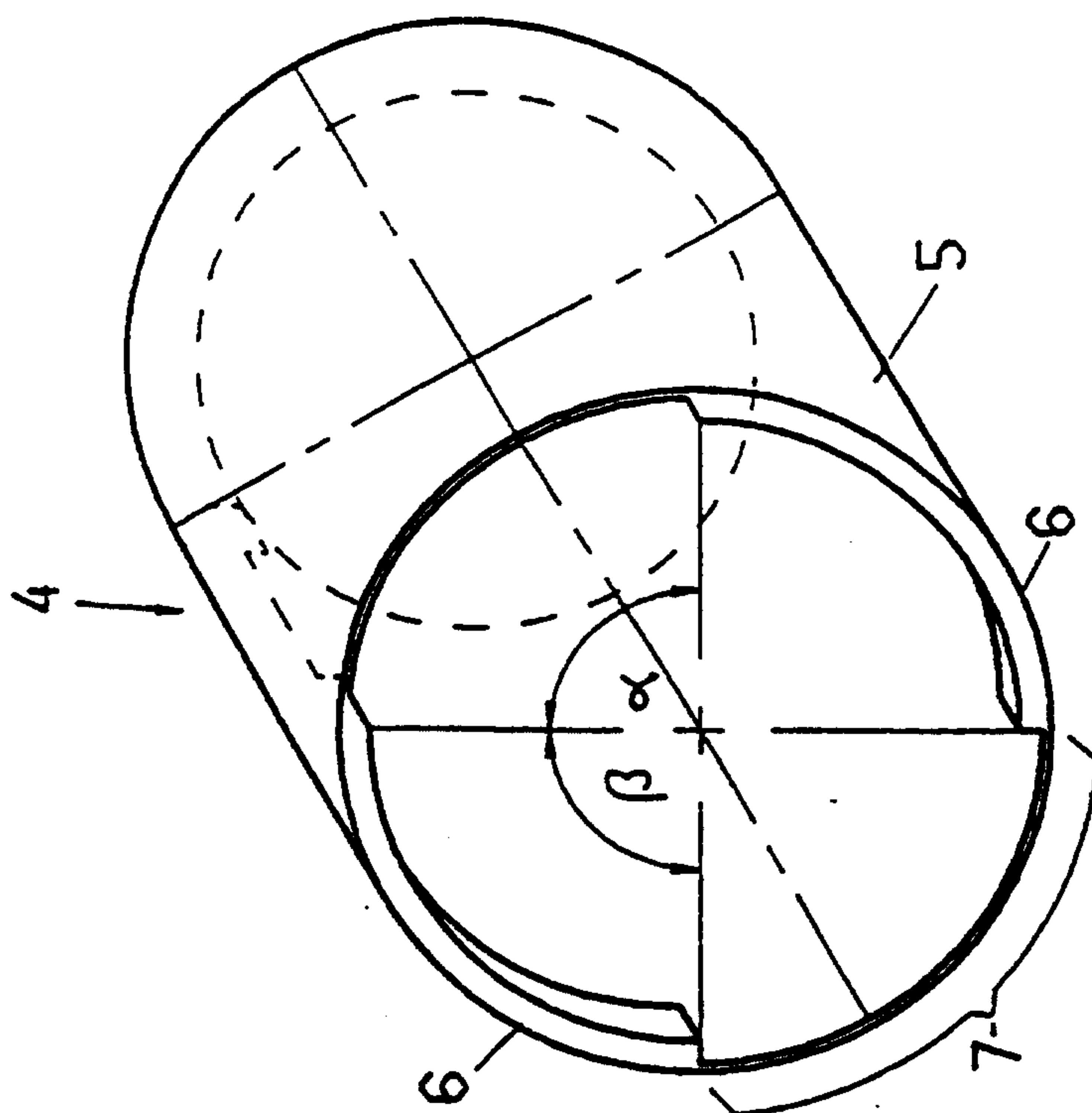


Fig. 2

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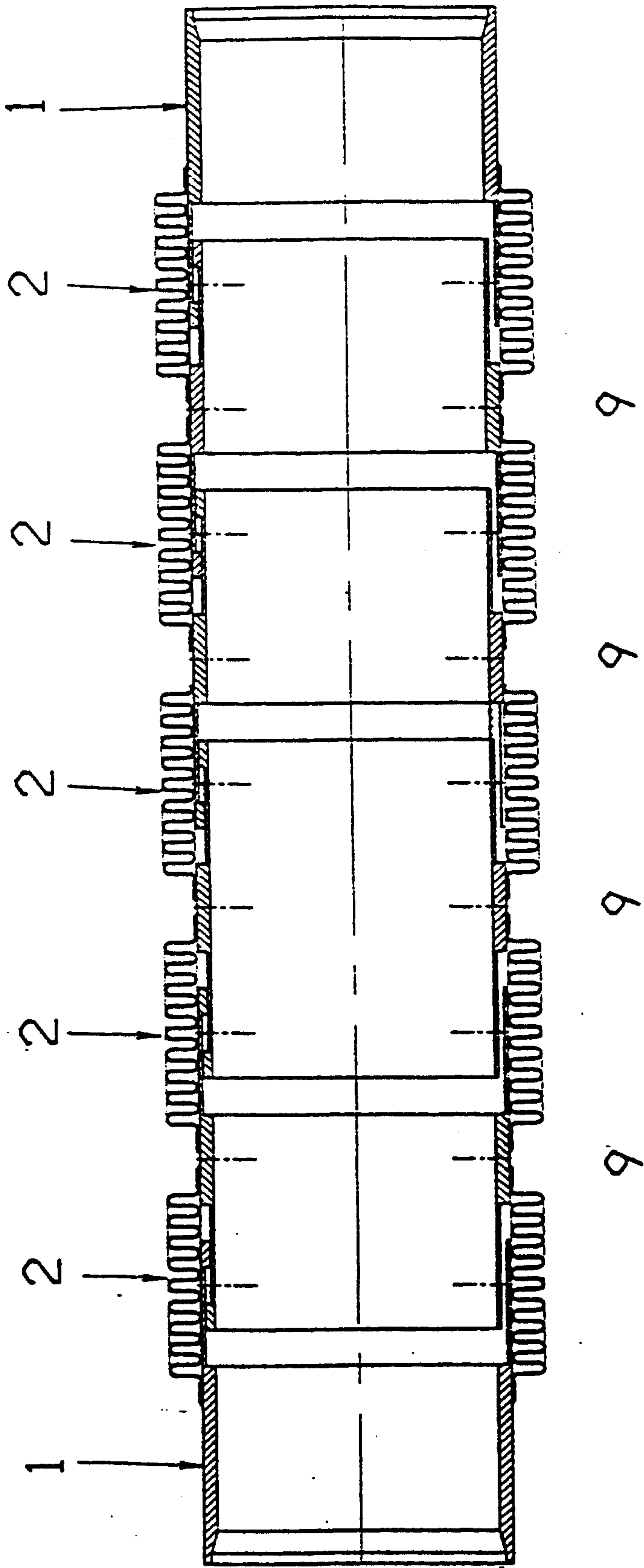


Fig. 4