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(72) Feltaláló(k):
MENNUCCI, Giovan, Battista, I-55100 S. Stefano di Moriano (IT)
PIERUCCINI, Simone, I-55100 Lucca (IT)
RAFFAELLI, Paolo, I-55100 Lucca (IT)
SIMONCINI, Francesco, I-55100 Lucca (IT)

(73) Jogosult(ak):
Toscotec S.p.A., 55014 Marlia (LU) (IT)

(74) Képviselő:
SBGK Szabadalmi Ügyvivői Iroda, Budapest

(54) **Szigetelő rendszer önlevevő gép szárítóhengeréhez**

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(54) **INSULATION SYSTEM FOR A YANKEE CYLINDER**

ISOLATIONSSYSTEM FÜR EINEN YANKEEZYLINDER

SYSTÈME D'ISOLATION POUR CYLINDRE FRICTIONNEUR

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(73) Proprietor: **Toscotec S.p.A.**
55014 Marlia (LU) (IT)

(72) Inventors:
- **MENNUCCI, Giovan, Battista**
  I-55100 S. Stefano di Moriano (IT)
- **PIERUCCINI, Simone**
  I-55100 Lucca (IT)
- **RAFFAELLI, Paolo**
  I-55100 Lucca (IT)
- **SIMONCINI, Francesco**
  I-55100 Lucca (IT)

(74) Representative: **Mincone, Antimo**
Viale Europa 101
IT-50126 Firenze (IT)

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Description

Technical Field

[0001] The present invention concerns improvements to the so-called Yankee cylinders used for the production of paper.

State of the art

[0002] According to the most traditional techniques, the paper is produced starting from an aqueous slurry of cellulosic fibers and possible further additives, with a very low dry content, in the order of fractions of percentage points by weight.

[0003] The slurry is fed from a headbox on a Fourdrinier wire and through subsequent steps between wires and felts, with the use of suction systems, the amount of water in the slurry is gradually reduced until obtaining a veil or layer of cellulosic fiber with a water content low enough to have a consistency which allows the veil to be passed through a drying system. In some machines for the production of paper the drying system comprises a Yankee cylinder, that is, an internally hollow cylinder, in which is circulated a heat transfer fluid, typically steam. The web of paper is dried, that is, its content of water is reduced, by evaporation at the expense of the heat transferred from the Yankee cylinder through its outer wall along which the veil of paper material is driven.

[0004] Examples of Yankee cylinders are disclosed in US-A-3,224,084; US-A-3,116,985; US-A-3,911,595; US-A-3,914,875; US-A-4,320,582; GB-685,009.

[0005] Traditionally, the Yankee cylinders were made of cast iron. More recently Yankee cylinders made of steel have been proposed, as disclosed for example in WO-A-2006/057023; WO-A-2008/105005.

[0006] The Yankee cylinders made of steel are normally made by welding and comprise an outer cylindrical surface formed by a cylindrical shell whose ends are fixed to the end heads. The connection is usually realized by welding. The end heads carry externally the support pins of the cylinder. Between the end heads and the shell it is defined the hollow inner volume of the Yankee cylinder in which is entered the steam for the heating of the outer surface of the Yankee cylinder.

[0007] The end heads of Yankee cylinders made of steel are generally flat, contrary to the end heads of Yankee cylinders made of cast iron, that have a curved shape, with a concavity facing outwards. An example of a Yankee cylinder made of steel is disclosed in WO-A-2008/105005.

[0008] The steam injected into the Yankee cylinder must transfer heat to the web of paper through the cylindrical surface. The waste heat through the surface of the end heads constitutes a loss of energy. US-A-4, 520.578 discloses a Yankee cylinder with concave end heads made of cast iron, provided with an insulating system whose function is to reduce the amount of heat wasted via the end heads. Other insulations of Yankee cylinders and/or other drying cylinders are disclosed in WO-A-82/03909, US-A-4321759, US-A-4, 454.660; US-A-4, 399.169, US-A-4, 506.459, US-A-4,372,055, US-A-4, 241.518, US-A-4, 313.267. All these insulation systems are anchored peripherally around the head, and make use, as anchor points, of the heads of the screws connecting the head to the shell of the cylinder. These insulation systems, therefore, are not suitable to insulate the end heads of a welded Yankee cylinder made of steel.

[0009] WO-A-2011/030363 discloses a system for insulating a steel Yankee cylinder. This system has been designed in particular for its application to Yankee cylinders without screws connecting the cylinder end heads to the shell. It provides for welding a perimetral ring along the outer edge of the head, to create anchor points of the insulation system without introducing areas of weakening on the head. This system is particularly efficient and solves many problems associated with the insulation of the Yankee cylinder. However, it is difficult to apply to cylinders already installed. The application of the fixing ring by welding is made during an intermediate stage of realization of the Yankee cylinder, so that tensions and deformations introduced by the welding can be removed by means of suitable heat treatments and machining. These operations can only be carried out during construction and, in any case, require properly equipped workspaces; and cannot be carried out on a Yankee cylinder already installed on a machine for the production of paper.

Summary of the invention

[0010] To solve in whole or in part the problems of the prior art, there is provided an insulation for the end heads of a Yankee cylinder, which is configured in such a way that it can be applied to the end heads of Yankee cylinders already installed work and in particular to the end heads of Yankee cylinders not predisposed to be insulated by systems applied during their construction. According to some embodiments, the insulation of the present invention can be applied in particular to steel Yankee cylinders, which do not exhibit suitable points, such as heads of screws for clamping the end heads to the shell, for fastening the insulation. In particularly advantageous embodiments, each insulation can be fixed to the respective cylinder head without necessity of mechanical processing.

[0011] Basically, in one embodiment the insulation comprises in combination:

- a plurality of insulation panels;
- a fastening ring divided into at least two portions and engageable to a support and rotation structure of the Yankee cylinder, said fasteing ring having screw means to constrain each of said insulation panels in a first radially innermost position;
- for each insulation panel, at least one intermediate

fastening element, configured to be bound to at least a head of a screw provided on the head of the Yankee cylinder at a radial distance from the support and rotation structure, the intermediate fastening element defining at least one fastening point for the respective insulation panel.

[0012] For support and rotation structure it is intended in general the components that allow to engage the Yankee cylinder in a rotatable manner to the support and rotation bearings. This structure comprises in general, on each head, a pin and a flange. The fastening ring may be suitably made to be fixed around the flange of the pin about which the cylinder rotates.

[0013] In possible embodiments, each insulation panel protrudes radially beyond said at least one fastening point and has a terminal abutment, to abut against the head of the Yankee cylinder to which the insulation is applied.

[0014] The insulation may further comprise, for each of the intermediate fastening elements, a securing member causing a mutual constraint between the intermediate fastening element and the respective insulation panel, designed to allow differential thermal deformations of the panel insulation relative to the end head. For example, the securing member may comprise, for each fastening point, a screw engageable in a threaded hole of the securing member and an anti-unscrewing device; and each insulation panel may exhibit, in correspondence of each fastening point, a hole for the passage of the respective screw, said hole having a diametral dimension greater than the diametral dimension of the stem of the screw passing through it, to allow for differential thermal expansion between the insulation panel and the intermediate fastening element. In some embodiments, the anti-unscrewing device may comprise a plate engaged to two adjacent screws with the flaps folded in such a way as to prevent rotation of the screws.

[0015] Use can be made of different anti-unscrewing devices. For example, the anti-unscrewing device may comprise an anti-unscrewing rosette interacting with the screw head and with a slot, that is, a hole in the insulation panel.

[0016] In some embodiments each of the intermediate fastening elements comprises a first clamping screw with a first housing engageable with a head of a screw on the cylinder head of the Yankee cylinder. In some embodiments, at least some of the intermediate fastening elements comprise a second clamping screw with a second housing for engagement with a head of a screw on the cylinder head of the Yankee cylinder.

[0017] The intermediate fastening elements, or at least some of them, may comprise one, two or a plurality of appendixes, each of them forming a respective fastening point for the respective insulation panel. For example, the intermediate fastening elements may have a symmetrical shape, i.e. may be fork-shaped, with two appendixes or prolongations that, extending from a central body or leg, destined to be fixed to one or two heads of respective screws provided on the cylinder head, are prolonged so as to form fastening points that are radially spaced in relation to the axis of the Yankee cylinder to which the insulation panels must be fixed.

[0018] In some embodiments, each insulation panel has two radial edges that preferably are rectilinear. The two anchorage points for fastening the insulation panel to the intermediate fastening element are, preferably, adjacent to radial edges of the insulation panel, so as to provide a more efficient and reliable fastening acting in a zone that is stiffened by suitable profiles.

[0019] In some embodiments, each insulation panel comprises a radially innermost edge, developed as a circular arc, provided with holes for the passage of screws for fastening the panel insulation to the fastening ring. In addition, each insulation panel may comprise a radially outermost edge, also preferably of circular shape. Between the radially outermost edge and the radially innermost edge, each panel may have two radial substantially straight edges, extending from the radially innermost edge to the radially outermost edge. Advantageously, the intermediate fastening points are arranged in an intermediate position between said radially innermost edge and said radially outermost edge, preferably near the straight edges.

[0020] In some embodiments, each of said panels of insulation comprises a plate forming a segment of annular crown, forming a radially outermost edge of circular shape, a radially innermost edge of circular shape and two substantially straight radial edges. Advantageously along each substantially straight radial edge is applied a respective profile having a wing approximately orthogonal to the plate, and facing the cylinder head to which the insulation is applied. Said wing allows to stiffen the structure of the panel.

[0021] In possible embodiments, for each insulation panel a first profile applied along a first of said radial edges protrudes with respect to said first radial edge, and a second profile applied along a second of said radial edges is set backward with respect to the second radial edge. Furthermore, between the second radial edge and the second profile through holes are preferably made in said plate, for the passage of screws for joining the radial edges of adjacent insulation panels. The joining screws inserted in through holes of a first insulation panel engage in threaded holes provided on the first profile of a second adjacent insulation panel.

[0022] Along the circular radially outermost edge a profiled element can be applied, for example with an L-shaped cross section, having a wing approximately orthogonal to said plate and possibly provided with a seal.

[0023] The seal forms a sealed bearing against the outer surface of the head of the Yankee cylinder.

[0024] The plate of each insulation panel may have a layer of thermally insulating material applied to the surface of the plate that, when the panel is applied to the Yankee cylinder, is arranged facing towards the respec-

tive cylinder head.

[0025] To allow easy application to a Yankee cylinder already installed, the fastening ring is formed from more portions and preferably by two substantially equal portions, joined together by clamping screws, preferably tangential.

[0026] To obtain a better mutual connection and therefore a greater mechanical strength, in advantageous embodiments the insulation panels are shaped and dimensioned so as to be arranged between them partially overlapped along the respective radial edges.

[0027] The object of the invention is also a Yankee cylinder comprising a cylindrical shell, two cylinder end heads and support and rotation structures extending from said end heads axially outwards, said cylinder comprising, on each of said end heads an insulation having one or more of the previous features. In particular, the Yankee cylinder comprises end heads connected with the shell by welding only, without making use of screws. Preferably, the Yankee cylinder includes an internal rod connecting the two end heads, joined to the latter by means of screws, to which the intermediate fastening elements of the insulation panels may be fixed.

[0028] The above summary description defines some features of the various embodiments of the present invention, for a better understanding of the detailed description which follows and in order to better evaluate its contribution to the state of the art. Of course there are other features of the invention that will be described below and set out in the appended claims, which also form an integral part of the description. In this respect, before explaining in detail the various embodiments of the invention, it is understood that the various embodiments of the invention are not limited in their application to the construction details and the arrangement of the components set out in the following description or illustrated in the drawings. The invention is susceptible of additional embodiments and may be practiced and carried out in various ways. In addition, it is understood that the phraseology and terminology used herein are for descriptive purposes and should not be regarded as limiting.

[0029] Moreover, those skilled in the art will appreciate that the concept on which is based the present disclosure can easily be used as a basis for the designing of other structures, methods and / or systems to perform the various objects of the present invention. Therefore, it is important to consider the claims as including such equivalent embodiments to the extent that they do not differ from the spirit and scope of the present invention.

Brief description of the drawings

[0030] A more complete appreciation of the embodiments of the invention which are described here and most of the advantages relating to it, will be better understood with reference to the following detailed description taken in conjunction with the accompanying drawings, wherein:

Fig.1 shows a longitudinal section of a Yankee cylinder without insulation;

Fig.2 shows a front view of an isolated insulation panel;

Figs 3, 4 and 5 show local sections along lines III-III, IV-IV and V-V of Fig.2 respectively;

Fig 6 shows a front view of the fastening ring isolated;

Fig.7 shows a local section along line VII-VII of Fig.6;

Fig.8 shows an enlarged view of a detail along VIII-VIII of Fig.6;

Fig.9 shows a magnified view of the area indicated with IX-IX in Fig.6;

Fig.10 shows a front view of an isolated intermediate fastening element;

Fig.11 shows a view along line XI-XI of Fig.10;

Fig 12 shows a front view according to XII-XII of Fig 1 of the Yankee cylinder with the insulation installed;

Fig 13 shows a section along line XIII-XIII of Fig.12;

Figs. 14 and 15 show enlargements of details XIV and XV of Fig.13;

Fig.14A shows a view along the line A-A of Fig.14;

Fig.16 shows an enlargement of detail XVI of Fig.12;

Fig.17 shows an enlargement of detail XVII of Fig.13;

Fig.18 shows a section along line XVIII-XVIII of Fig.12.

Detailed description of embodiments of the invention

[0031] The following detailed description of exemplary embodiments refers to the accompanying drawings. Like reference numerals, recurring in different drawings represent identical or similar elements. The drawings are not necessarily to scale. In addition, the following detailed description does not limit the invention. On the contrary, the scope of the invention is defined by the appended claims.

[0032] Throughout the description, the reference to "one embodiment" or "some embodiments" means that a particular feature, structure or properties described in connection with an embodiment is included in at least one embodiment of the object described. Therefore the use of the phrase "in one embodiment" or "some embodiments" or similar expressions or having an equivalent meaning in different points of the description will not necessarily refer to the same embodiment or to the same embodiments. Furthermore, the particular features, structures or properties can be combined in any suitable manner in one or more embodiments.

[0033] In Fig.1 a Yankee cylinder 2 is shown in its entirety in a longitudinal section containing the axis of rotation A-A of the cylinder itself. In this figure the Yankee cylinder is without insulation. The Yankee cylinder 2 comprises a main body 1 and support and rotation structures 3, through which the cylinder 2 is supported, by means of supporting bearings support 5 and 7, by a fixed structure, not shown. Through the support and rotation 3 structures a heat transfer fluid, typically steam, is made to circulate filling the inner chamber of the Yankee cylinder.

The latter is realized inside the body 1 of the Yankee cylinder. The body 1 of the Yankee cylinder 2 may comprise a cylindrical shell 11 formed from a calendered plate and with edges welded along a generatrix or along an inclined helical line on the cylindrical surface of the same Yankee cylinder.

[0034] The cylindrical shell can also be realized through the association of two or more cylinders of smaller size, obtained by rolling and welding of a plate. In this case the association between two contiguous cylindrical shells can be made by means of a circumferential weld, if the contact takes place on a plane orthogonal to the axis of the shell, or by means of an elliptical weld, if the contact takes place on a plane inclined with respect to the axis of the shell. The cover 11 is joined, at its ends, to two end heads 13 and 15, to which, in turn, are fixed the support and rotation structures 3 as described hereinafter.

[0035] In an advantageous embodiment, the support and rotation structures 3 have each a flange 3A united for example by means of screws 16 to the respective end heads 13 and 15. The screws 16 are arranged in a circular disposition around holes 13A and 15A made in the end heads 13 and 15. The respective pins 18 rotating inside the supporting bearings 5 and 7 are extended axially outwards from the flanges 3A, orthogonally to the end heads 13, 15. The pins 18 can be axially perforated for the passage of a heat transfer fluid, typically steam.

[0036] In some embodiments, the inner surface of the calendered plate forming the cylindrical shell 11 is provided with a plurality of annular grooves 11A where it is collected the condensation due to the transfer of thermal energy from the steam injected into the chamber inside the body 1 of the Yankee cylinder 2 to the external environment. Fig.1 shows only some of the grooves 11A, near the end heads 13, 15, but it should be understood that normally the grooves are uniformly distributed throughout the longitudinal development of the Yankee cylinder 2. In a manner known per se and not shown, condensation is sucked from the bottom of the annular grooves 11A and recirculated. According to other embodiments, the internal surface of the cylindrical shell is not grooved.

[0037] According to an advantageous embodiment, the cylindrical shell 11 is joined to the end heads 13 and 15 by a weld made with circular weld beads 20.

[0038] In some embodiments, such as that illustrated, inside the Yankee cylinder 2 is disposed a tie rod 21 which extends from one to another of the end heads 13, 15. In some embodiments the tie rod 21 has a cylindrical structure 21A with end annular flanges 21B, through which the ends of the tie rod 31 are anchored to the end heads 13 and 15. In the illustrated embodiment the tie rod 21 is fixed to the end heads 13, 15 through two sets of screws for each end head, arranged according to two circular dispositions around the axis A-A of the Yankee cylinder 2. The screws are indicated with 23 and 25, the screws 23 being disposed along a circumference of smaller diameter and the screws 25 being disposed along a circumference of greater diameter.

[0039] As shown in Fig 1, in which the Yankee cylinder is represented without insulation, the surface of each end head 13, 15 has not anchorages for the insulation, with the exception of the flange 3A of each support and rotation structure 3 and with the exception of the screws 23, 25. Moreover, all these elements are located within an annular zone of radius R1, substantially lower than the total radius R2 of the Yankee cylinder. In the outer annular crown of width equal to R2-R1 the end heads 13 and 15 do not exhibit elements for fastening the insulation and is therefore necessary to provide a system for fastening the insulation that can be applied to the Yankee cylinder 2 even when the latter is already installed and inserted inside a fixed structure, in which are housed the bearings 5 and 7.

[0040] An embodiment of an insulation according to the invention, applicable to a Yankee cylinder 2 of the type described above, will be explained in the following with reference to Figs.2 to 18.

[0041] A first component of the insulation is constituted by an insulation panel 51. The complete insulation of each single end head 13, 15 comprises a plurality of such insulation panels partially overlapped and connected to each other. As can be seen in particular in Figure 12, in the embodiment shown there are provided ten insulation panels 51, nine of which are mutually identical and one has an opening for the access to a manhole 52 (Fig. 1) possibly exhibited by the Yankee cylinder 2.

[0042] In other embodiments the number of insulation panels can be different from that illustrated. Furthermore, in some embodiments all of the panels may be identical to each other, without openings for access to the manhole. In some cases, the manhole is provided only on one end head and then the panel with a corresponding opening will be applied only on one side of the cylinder.

[0043] As shown in Fig. 2 to 5, each insulation panel 51 has substantially the shape of a segment of annular ring defined by two radial edges and two circular inner and outer edges.

[0044] The insulation panel 51 may comprise a plate 53 forming the main body of the panel 51, to which is applied a thermally insulating material, for example formed from one or more cushions of thermally insulating material, such as rock wool or glass wool. The insulating material is shown only schematically and partially in Fig.13, where it is marked with the reference "I". In the remaining figures it is omitted for the sake of clarity.

[0045] In the illustrated embodiment the plate 53 has a radially innermost edge 53A and a radially outermost edge 53B. The two edges 53A, 53B have the shape of an arc of circumference and are concentric with one another and are concentric with respect to the axis A-A of the Yankee cylinder 2 on which the panel 51 is applied. The plate 53 has, moreover, a first substantially straight 53C radial edge, and a second substantially straight radial edge 53D.

[0046] Along the first radial edge substantially straight 53C it is applied a first profiled element 55. In the illustrated embodiment the profiled element 55 has an L-shaped cross section, with a first wing 55A and a second wing 55B. The first wing 55A extends substantially perpendicular to the plane of the plate 53, while the second wing 55B extends substantially parallel to the plane of the plate 53. The first profiled element 55 is fixed to the plate 53 by means of a plurality of screws 57 and nuts and lock nuts 59, as shown in detail in Fig 5. The wing 55B of the profiled element 55 can be engaged between the plate 53 and a flat profiled element 61 which is clamped against the L-shaped element 55, so that the wing 55B remains locked between the plate 53 and the flat profiled element 61. At appropriate intervals, parallel to the first rectilinear edge 53C of the plate 53, on the wing 55B of the respective profiled element 55 there are threaded holes 63 which extend also in the flat profiled element 61 (see again Fig 5). The threaded holes 63 are made in a part 55B of the wing of the profiled element 55 that protrudes with respect to the edge 53C.

[0047] Along the opposite substantially straight edge 53D of the plate 53, by means of screws 65 and nuts 67, is fixed a second profiled element 69, for example L-shaped, comprising a first wing 69A substantially orthogonal to the plate 53 and a second wing 69B substantially parallel to the plate 53. The profiled element 69 is mounted behind the edge 53D of the plate 53, so that the plate 53 protrudes by a certain amount in relation to the profiled L-shaped element 69. In the illustrated embodiment, along the portion of the plate 53 projecting beyond the profiled element 69, between the latter and the edge 53D of the plate, there are through holes 71 for screws allowing a mutual locking between adjacent and partially overlapping insulation panels 51, with an arrangement that will be described in greater detail with reference to Fig.18.

[0048] In the illustrated embodiment , along the radially innermost circular edge 53A the plate 53 has a plurality of through holes for locking of the insulation panel 51 to a clamping ring described in the following.

[0049] Along the radially outermost edge 53B, and approximately in alignment with it or slightly behind (Fig.3) with respect to said edge 53B, on the inner surface of the plate 53 is applied a further profiled element 75, preferably an L-shaped profiled element, with a first wing 75A substantially orthogonal to the plane in which the plate 53 lies and a second wing 75B substantially parallel to the plate 53 and in contact with the inner surface of the plate itself, i.e. with the surface facing the corresponding end head 13, 15 of the Yankee cylinder 2 when the insulation is installed. In the example shown the profile 75 is fixed to the plate 53 by means of screws 77 and nuts 79.

[0050] In other embodiments the profiled elements 55, 69, 75 may have a cross section different from the one represented here. For example, they may have an L-shaped section with wings different from each other, or at least some of these profiled elements may be I-shaped or H-shaped. In the illustrated embodiment, furthermore, the profiled elements have identical cross. This can provide advantages in terms of economy of supply, production and storage, but the possibility of making use of differently shaped profiled elements is not excluded.

[0051] In the illustrated embodiment the profiled elements 55, 69 and 75 are fixed to the plate 53 by screws. In other embodiments, not shown, other fastening systems may be used. For example, the profiled elements 55, 69 and 75 can be fixed to the plate 53 of the insulation panel 51 by welding, riveting or other suitable systems. It is also possible to make use of different fixing modes on different profiled elements of the same panel, or for the profiled elements of different panels.

[0052] In the illustrated embodiment the insulating system according to the invention comprises, for each end head 13, 15 of the Yankee cylinder 2 to be insulated, apart from a plurality of insulation panels 51 as described above and illustrated in particular in Figs 2 to 5, a fastening ring generally indicated with the reference numeral 81 and shown in particular in Figs 6 to 9. The fastening ring 81 is designed to be clamped on the flange 3A of the support and rotation structure 3 of the corresponding end head 13 or 15 of the Yankee cylinder 2.

[0053] Preferably, to allow the mounting of the fastening ring 81 on the Yankee cylinder 2 when this is already installed in the production line, the fastening ring is formed by two or more portions or parts that can be fastened between them. In the illustrated embodiment, see in particular Fig.6, the fastening ring 81 is divided into two portions 81A that are substantially identical to each other. The two portions 81A are mutually joined opposite to each other by means of screws arranged in diametrically opposite areas where the ends of the two portions 81A of the fastening ring 81 are opposite to each other. More particularly, with 83 are indicated two innermost screws and with 85 two outermost screws, mounted tangentially in diametrically opposite positions orthogonally to two surfaces facing each other of the two portions 81A of the fastening ring 81.

[0054] In some embodiments, along the circumferential surface of the fastening ring 81 there are holes for the fixing of the insulation panels 51. In some advantageous embodiments the holes 87 are threaded holes. The threaded holes 87 can be through threaded holes, i.e. threaded holes crossing the whole thickness of a radially outermost annular zone of the portions 81A of the fastening ring 81, as shown in the drawings. The threaded holes 87 are accessible for screwing the screws 88 (see in particular figs. 12 and 15) intended to lock the insulation panels to the flat side 81B of the fastening ring 81.

[0055] As shown in particular in Figs.12 and 13, the fastening ring 81 is clamped around the flange 3A and to the respective support and rotation structure 3 of the end head 13 or 15. In this way, as will become clear in the following, the insulation panels 51 can be fastened with their radially innermost circumferential edges 53A along the fastening ring 81 that in turn is clamped around the flange 3A of the support and rotation structure 3.

[0056] In the illustrated embodiment, the insulation system further comprises, for each insulation panel 51, at least one intermediate fastening element, one of which is individually shown in Figs 10 and 11 and is generally indicated with 91. In the illustrated example the intermediate fastening element 91 comprises a shank or stem 93 from which protrude two appendices 95 and 97 which are substantially symmetrical with respect to a center plane whose trace is indicated with p-p (Fig.10). Therefore, the intermediate fastening element has, in this embodiment, approximately the shape of a fork. Others embodiments are also possible, as will become clear in the following, even though the shape now illustrated is particularly effective.

[0057] In the illustrated embodiment the stem 93 defines a first housing 99 and a second housing 101 for the engagement of the intermediate fastening element 91 respectively to the heads of the screws 25 and 23, with which the tie rod 21 is fixed to the end heads 13 and 15 . In the illustrated embodiment the first housing 99 and the second housing 101 have a circular shape and are formed by elastically deformable portions of the shank 93.

[0058] More particularly, the housing 99 is partially delimited by an elastically deformable appendix 99A for tightening the housing 99 around the head of the corresponding screw 25, for which purpose the shank 93 has a notch 99B. Likewise the housing 101 is delimited by two portions 101A, 101B separated by a notch 101C to tighten the housing 101 around the head of the corresponding screw 23. The tightening of the two housings 99 and 101 around the heads of the screws 25 and 23 takes place by means of corresponding screw members 103 and 105, visible in particular in Fig.16.

[0059] In this way each intermediate fastening element 91 can be fixed on the corresponding end head 13 or 15 of the Yankee cylinder 2 in a position such that the appendixes 95 and 97 extend away from the axis A-A of the Yankee cylinder 2 towards the peripheral edge of the respective end head, in order to define anchor points for the insulation arranged at a distance from the axis A-A of the Yankee cylinder 2 greater than the radial distance of the screws 23, 25 used for fixing the internal tie rod of said Yankee cylinder 2.

[0060] Each appendix 95, 97 has, in proximity to its distal end 95A, 97A (i.e. the end opposite to the shank 93) a respective threaded hole 107, 109. The threaded holes 107, 109 permit the use of mounting screws 111 with which each insulation panel 51 is fixed in an intermediate position to the intermediate fastening element 91 and, through the latter, to the respective end head 13 or 15.

[0061] In the assembled configuration (Figs.12 and 16) the intermediate fastening elements 91 are positioned in such a way that the threaded holes 107, 109 are aligned with the holes 73 of the insulation panels 51. More particularly, each intermediate fastening element 91 is located with the holes 107, 109 in alignment with the holes 73 of a respective insulation panel 51, so that for each end head it will be used a number of intermediate fastening elements 91 equal to the number of insulation panels 51. In other embodiments it is not excluded the possibility of using a number of intermediate fastening elements different for each insulation panel, for example, two intermediate fastening elements, one for each hole 73, possibly anchored to different pairs of screws 23, 25. In some embodiments there may be two or more intermediate fastening elements for each insulation panel 51, fixed to different screws 23, 25, for example an intermediate fastening element fixed to a screw 23 and another intermediate element fixed to a screw 25. In further embodiments it can also foreseen only one intermediate fastening element bound only to a respective screw 25, or only to a screw 23, or to two screws 23 but not to the screws 25 or, vice versa, to the screws 25 and not to the screws 23.

[0062] Even in the case of an intermediate fork-shaped fastening element 91 such as the one shown in Fig.10, the fastening may be provided on only one of the screws 25, 23 instead of both as in the embodiment illustrated in the drawing.

[0063] In some embodiments, the screws 111 used to secure each panel of insulation 51 to the respective intermediate fastening element 91 have a particular shape shown in detail in Fig.14. These screws have a head 111A, preferably hexagonal, of large dimensions with respect to the leg 111B, which is extended by a threaded shank 111C. The threaded shank 111C has a length such that it does not protrude from the threaded through hole 107, or 109, but remains inside it. In this way, in the event of a complete tightening of the screw, the upper stop formed by the portion of greater diameter of the rod 111B touches the outer surface of the intermediate fastening element 91 before the threaded shank 111C comes into contact with the surface of the end head. If this were not the case, the screw could push away the fastening intermediate element 91 acting like an extraction screw. The diameter D of the stem 111E is advantageously smaller than the diameter D0 of the through hole 73 of the insulation panel 51. In this way, as can be understood by observing the local section in Fig.14, the insulation panel 51, and in particular the plate 53 which supports the thermally insulating material, can have a thermal expansion different from that of the intermediate fastening element 91. This different thermal expansion can be determined not only by the different materials used for these two components, but also and above all because they are at temperatures substantially different from one another: the intermediate fastening element 91, being in contact with the respective end head 13 or 15, is at a temperature higher than that of the plate 53 forming the outer part of the insulation panel 51. The better the insulation is, the greater is the difference of temperature between the intermediate fastening element 91 and the plate 53 of the insulation panel 51. The difference between the diameters D and DO allows the element intermediate fastening

element 91 to dilate and then to stretch radially outward of an amount greater than the dilatation of the plate 53.

[0064] In some embodiments, as shown in particular in Figure 14, it is also provided a particular anti-unscrewing system to prevent the screws 111 from loosening for example because of the dynamic stresses to which the Yankee cylinder 2 is subject. Fig.14A schematically shows, in a view along the line A-A of Fig.14, an embodiment of the anti-unscrewing system. In this case two screws 111 inserted in adjacent holes 73 of two contiguous insulation panels 51 are blocked by a plate common 112, for example of rectangular shape, with two holes through which pass the two screws 111. Two opposite corners 112A of plate 112 are folded against the respective faces of the two hexagonal heads of screws 111, so as to lock both screws against any accidental unscrewing.

[0065] Fig.14 shows the detail of a reinforcement plate 53P applied on the face of the plate 53 of the insulation panel 51 facing towards the end head to which the insulation panel 51 is fixed. The reinforcement plate 53P is advantageously perforated in correspondence of the hole 73 to allow the passage of the shank 111B of the screw 111.

[0066] The overall insulation formed by the elements described so far is shown in detail in the assembled configuration in Figs.12 to 18. Each of the two end heads 13, 15 is coated with an insulation formed by a plurality (ten in the illustrated example) of insulation panels 51, which are partially overlapped at the radial straight edges as shown in the detail of Fig.18. In this detail, that shows a local section along line XVIII-XVIII of Fig.12, it is represented a locking screw 121 advantageously provided with an anti-unscrewing rosette 123 and inserted into each threaded hole 63 of which is provided with the profiled element 55 which forms the outer radial edge of the panel itself protruding with respect to the edge 53C of the sheet 53. In the assembled configuration each threaded hole 63 of the L-shaped profiled element 55 of an insulation panel 51 is aligned with a corresponding hole 71 formed along the edge 53D of the plate 53 of the adjacent panel. In this way, each pair of adjacent insulation panels 51 are joined to one another in the area in which the projecting portion of the plate 53 of a panel overlaps the profiled element 55 of the adjacent panel, by inserting a series of screws 121 in the through holes 71 of a panel and screwing them into the corresponding threaded holes 63 made in the wing 55B of the profiled element 55 and in the reinforcement plate 61 of the adjacent insulation panel 51.

[0067] The panels are also fixed by the screws 88 at the radial innermost edges 53A of the fastening ring 81, in turn locked by means of the screws 83, 85 tangential to the flange 3A of the respective support and rotation structure 3.

[0068] Finally, in an intermediate position, along the intermediate circumference 53M, each insulation panel 51 is fixed in correspondence of the fastening points defined by the holes 73 by means of screws 111 to the fork-shaped intermediate fastening element 91, in turn locked by means of the screws 103 and 105 on the heads of the screws 25 and 23 used for mounting the tie rod 21 inside the Yankee cylinder 2.

[0069] Each insulation panel 51 extends radially outwardly beyond the circumference 53M substantially up to the peripheral edge of the respective end head 13, 15. The locking realized by means of the screws 111 in the intermediate anchor points defined by the holes 73 and the fastening by means of the screws 88 along the fastening ring 81 allow the insulation thus formed to remain adherent to the end head 13, 15. Besides the fastening realized through the screws 111 and the screws 88, the locking of the insulation formed by the partially overlapping panels 51 is also achieved through the support offered by the L-shaped profiled elements 55, 61 and 75. In particular, the curved profiles 75 that follow the radially outermost circular edge 53B of the individual insulation panels 51 can be advantageously equipped, on the wing 75A, with a gasket 127 (see detail of Fig.17) which forms a support and a seal against the outer surface of the end head 13 or 15 to which the single insulation panel 51 is anchored.

[0070] It is understood that what has been illustrated and described represents only possible not limitative embodiments of the invention, which may vary in configurations and arrangements without departing from the scope of the concept underlying the invention. The presence of any reference numerals in the attached claims has the sole purpose of facilitating the reading of the preceding description and the attached drawings and do not in any way limit the scope of protection.

Claims

1. An insulation for the end heads (13, 15) of a Yankee cylinder (2), comprising:

   - a plurality of insulating panels (51);
   - a fastening ring (81) divided into at least two portions (81A) and engageable with a support and rotation structure (3) of the Yankee cylinder, said fastening ring having fastening members (88) to constrain each of said insulating panels in a first radially inner position;
   - for each insulating panel (51), at least one intermediate fastening element (91), configured to be constrained to at least one head of a screw (111) provided on the end head (13; 15) of the Yankee cylinder (2) at a radial distance from said support and rotation structure (3), said intermediate fastening element (91) defining at least one fastening point for the respective insulating panel (51).

2. Insulation as claimed in claim 1, wherein said fas-

tening members (88) for constraining each insulating panel (51) to said fastening ring (81) in a first radially inner position are screw members.

3. Insulation as claimed in claim 1 or 2, wherein each insulating panel (51) extends radially beyond said at least one fastening point and has an end rest, to rest against the end head (13; 15) of the Yankee cylinder (2) to which the insulation is fitted.

4. Insulation as claimed in claim 1 or 2 or 3, also comprising, for each of said intermediate fastening elements (91), a mutual constraining member between the intermediate fastening element (91) and the respective insulating panel (51), configured to allow differential thermal deformations of the insulating panel (51) with respect to the end head (13; 15).

5. Insulation as claimed in claim 4, wherein said constraining member comprises, for each fastening point, a screw (111) engageable in a threaded hole (107; 109) of said constraining member and a self-locking device (112); and each insulating panel (51) has, at each fastening point, a hole for passage of the respective screw (111), said hole having a diametral dimension (DO) greater than the diametral dimension (D)of the shank of the screw (111) passing therethrough, to allow different thermal dilation between the insulating panel (51) and intermediate fastening element (91).

6. Insulation as claimed in claim 5, wherein said self-locking device (112) comprises self-locking members interacting with the heads (111A) of two said adjacent screws.

7. Insulation as claimed in one or more of the preceding claims, wherein each of said intermediate fastening elements (91) comprises a first screw clamping device with a first seat (99) engageable with a head of a screw (25) on the end head of the Yankee cylinder (2), wherein at least some of said intermediate fastening elements (91) comprise a second screw clamping device with a second seat (101) engageable with a head of a screw (23) on the end head of the Yankee cylinder, and wherein at least some of said intermediate fastening elements comprise a stem (93) forming said two screw clamping devices, and at least a first extension (95) forming said at least one fastening point of a respective insulating panel (51).

8. Insulation as claimed in claim 7, wherein at least some of said intermediate fastening elements (91) comprise a second extension (97) forming a further fastening point of the respective insulating panel (51).

9. Insulation as claimed in claim 8, wherein said insulating panels (51) each have two radial edges (53C, 53D) and wherein the two fastening points of the insulating panel (51) to the intermediate fastening element (91) are located adjacent to radial edges (53C, 53D) of the insulating panel (51).

10. Insulation as claimed in one or more of the preceding claims, wherein each insulating panel (51) comprises: a radially inner edge (53A), with circular arc extension, provided with holes for the passage of fixing screws (88) to said fastening ring (81); a radially outer edge (53B) with circular extension; two substantially rectilinear radial edges (53C, 53D), extending from the radially inner edge (53A) to the radially outer edge (53B), said at least one intermediate fastening point being in an intermediate position between said radially inner edge (53A) and said radially outer edge (53B).

11. Insulation as claimed in one or more of the preceding claims, wherein said insulating panels (51) comprise a plate (53) forming a segment of annular ring, with a radially outer edge (53B) with circular extension, a radially inner edge (53A) with circular extension and two substantially rectilinear radial edges (53C, 53D), and wherein along each of said substantially radial rectilinear edges, there is fitted a respective profile (55) having a wing (55B) approximately orthogonal to said plate, facing the end head (13; 15) to which the insulation is fitted.

12. Insulation as claimed in claim 11, wherein for each insulating panel (51) a first profile (55) fitted along a first of said radial edges projects relative to said first radial edge, and a second profile (69) fitted along a second of said radial edges is set back relative to the second radial edge; and wherein between the second radial edge and the second profile there are produced through holes in said plate, for the passage of joining screws of the radial edges of mutually adjacent insulating panels (51), said joining screws inserted in through holes of a first insulating panel (51) engaging in threaded holes provided on the first profile of a second adjacent insulating panel (51).

13. Insulation as claimed in claim 11, wherein along said radially outer edge with circular extension there is fitted a profile (75) having a wing (75A) approximately orthogonal to said plate.

14. Insulation as claimed in claim 13, wherein said profile (75) fitted along the radially outer edge of each insulating panel (51) is provided with a gasket (127).

15. Insulation as claimed in one or more of the preceding claims, wherein said fastening ring (81) is formed by at least two substantially equal portions, mutually

joined by tangential clamping screws (83; 85).

16. Insulation as claimed in one or more of the preceding claims, wherein said insulating panels (51) are structured and sized so as to be arranged partially mutually overlapping along radial edges.

17. A Yankee cylinder (2) comprising a cylindrical shell (11), two end heads (13, 15) and support and rotation structures (3)extending axially outward from said end heads, said cylinder (2) comprising on each of said end heads (13, 15) an insulation as claimed in one or more of the preceding claims.

Patentansprüche

1. Isolationssystem für die Endköpfe (13; 15) eines Yankee-Zylinders (2), das Folgendes umfasst:

- eine Vielzahl von Isolationsplatten (51),
- einen Befestigungsring (81) der in wenigstens zwei Teile (81A) unterteilt ist und mit einer Trag- und Rotationsstruktur (3) des Yankee-Zylinders in Eingriff gebracht werden kann, wobei der Befestigungsring Befestigungselemente (88) aufweist, um jede der Isolationsplatten in einer ersten, radial inneren Position festzulegen, und
- für jede Isolationsplatte (51) wenigstens ein Zwischen-Befestigungselement (91), das so konfiguriert ist, dass es an wenigstens einem Kopf einer Schraube (111) befestigt werden kann, die am Endkopf (13; 15) des Yankee-Zylinders (2) mit einem radialen Abstand von der Tragund Rotationsstruktur (3) vorgesehen ist, sodass das Zwischen-Befestigungselement (91) wenigstens einen Befestigungspunkt für die betreffende Isolationsplatte (51) bildet.

2. Isolationssystem nach Anspruch 1, bei dem die Befestigungselemente (88) zum Befestigen einer jeden Isolationsplatte (51) am Befestigungsring (81) in einer ersten, radial inneren Position Schraubenelemente sind.

3. Isolationssystem nach Anspruch 1 oder 2, bei dem jede Isolationsplatte (51) sich radial über den wenigstens einen Befestigungspunkt hinaus erstreckt und eine Endanlage aufweist, um am Endkopf (13; 15) des Yankee-Zylinders (2) anzulegen, an dem das Isolationssystem befestigt ist.

4. Isolationssystem nach Anspruch 1, 2 oder 3 das weiterhin für jedes der Zwischen-Befestigungselemente (91) ein Befestigungselement zur gegenseitigen Befestigung zwischen dem Zwischen-Befestigungselement (91) und der betreffenden Isolationsplatte (51) umfasst, das so ausgebildet ist, dass es differenzielle thermische Verformungen der Isolationsplatte (51) bezüglich des Endkopfes (13; 15) ermöglicht.

5. Isolationssystem nach Anspruch 4, bei dem das Befestigungselement für jeden Befestigungspunkt eine Schraube (111), die in einem Gewindeloch (107; 109) des Befestigungselementes in Eingriff gebracht werden kann, und eine Selbstblockierungsvorrichtung (112) umfasst, und dass jede Isolationsplatte (51) an jedem Befestigungspunkt ein Loch für das Hindurchtreten der entsprechenden Schraube (111) umfasst, wobei dieses Loch einen Durchmesser (D0) aufweist, der größer ist als der Durchmesser (D) des Schaftes der durch dieses Loch hindurchtretenden Schraube (111), um eine differenzielle thermische Erweiterung zwischen der Isolationsplatte (51) und dem Zwischen-Befestigungselement (91) zu ermöglichen.

6. Isolationssystem nach Anspruch 5, bei dem die Selbstblockierungsvorrichtung (112) Selbstblockierungselemente umfasst, die mit den Köpfen (111A) der beiden benachbarten Schrauben in Wechselwirkung stehen.

7. Isolationssystem nach einem oder mehreren der vorhergehenden Ansprüche, bei dem jedes der Zwischen-Befestigungselemente (91) eine erste Schraub-Klemmvorrichtung mit einem ersten Sitz (99) umfasst, die mit einem Kopf einer Schraube (25) am Endkopf des Yankee-Zylinders (2) in Eingriff gebracht werden kann, wobei wenigstens einige der Zwischen-Befestigungselemente (91) eine zweite Schraub-Klemmvorrichtung mit einem zweiten Sitz (101) aufweisen, die mit dem Kopf einer Schraube (23) am Endkopf des Yankee-Zylinders in Eingriff gebracht werden kann, und wobei wenigstens einige der Zwischen-Befestigungselemente einen Ansatz (93) umfassen, der zwei Schraub-Klemmvorrichtungen bildet, und wenigstens eine erste Verlängerung (95) die den wenigstens einen Befestigungspunkt für eine entsprechende Isolationsplatte (51) bildet.

8. Isolationssystem nach Anspruch 7, bei dem zumindest einige der Zwischen-Befestigungselemente (91) eine zweite Verlängerung (97) umfassen, die einen weiteren Befestigungspunkt für die betreffende Isolationsplatte (51) bildet.

9. Isolationssystem nach Anspruch 8, bei dem die Isolationsplatten (51) jeweils zwei radiale Kanten (53C, 53D) aufweisen und bei dem die beiden Befestigungspunkte der Isolationsplatten (51) an dem Zwischen-Befestigungselement (91) in der Nähe der radialen Kanten (53C, 53D) der Isolationsplatte (51) positioniert sind.

10. Isolationssystem nach einem oder mehreren der vorhergehenden Ansprüche, bei dem jede Isolationsplatte (51) Folgendes umfasst: eine radial innere Kante (53A) mit einer Kreisbogenverlängerung, die mit Löchern für das Hindurchtreten von Befestigungsschrauben (88) zu dem Befestigungsring (81) versehen ist, eine radial äußere Kante (53B) mit einer kreisförmigen Verlängerung, zwei im Wesentlichen geradlinige radiale Kanten (53C, 53D), die sich von der radial inneren Kante (53A) zur radial äußeren Kante (53B) erstrecken, wobei der wenigstens eine Zwischen-Befestigungspunkt sich an einer Stelle zwischen der radial inneren Kante (53A) und der radial äußeren Kante (53B) befindet.

11. Isolationssystem nach einem oder mehreren der vorhergehenden Ansprüche, bei dem die Isolationsplatten (51) eine Platte (53) umfassen, die ein Segment eines Kreisrings mit einer radial äußeren Kante (53B) mit kreisförmiger Verlängerung, eine radial innere Kante (53A) mit kreisförmiger Verlängerung und zwei im Wesentlichen geradlinigen radialen Kanten (53C, 53D) aufweist, und wobei längs jeder der im Wesentlichen geradlinigen radialen Kanten ein entsprechendes Profil (55) eingepasst ist, das einen Flügel (55B) in etwa senkrecht zu besagter Platte besitzt, der dem Endkopf (13; 15) gegenüberliegt, an dem das Isolationssystem befestigt ist.

12. Isolationssystem nach Anspruch 11, bei dem für jede Isolationsplatte (51) ein erstes Profil (55), das längs einer ersten der radialen Kanten befestigt ist, relativ zu dieser radialen Kante bevorsteht, und dass ein zweites Profil (69) das längs einer zweiten der radialen Kanten befestigt ist bezüglich der zweiten radialen Kante nach hinten versetzt ist, und wobei zwischen der zweiten radialen Kante und dem zweiten Profil durchgehende Löcher in der Platte vorgesehen sind, die zum Hindurchtreten von Verbindungsschrauben der radialen Kanten von zueinander benachbarten Isolationsplatten (51) dienen, wobei diese Verbindungsschrauben, die in durchgehende Löcher einer ersten Isolationsplatte (51) eingesetzt sind, in Gewindelöcher eingreifen, die an dem ersten Profil einer zweiten benachbarten Isolationsplatte (51) vorgesehen sind.

13. Isolationssystem nach Anspruch 11, bei dem längs der radial äußeren Kante mit kreisförmiger Verlängerung ein Profil (75) befestigt ist, das einen Flügel (75A) besitzt, der sich ungefähr senkrecht zu dieser Platte erstreckt.

14. Isolationssystem nach Anspruch 13, bei dem das Profil (75), das längs der radial äußeren Kante einer jeden Isolationsplatte (51) befestigt ist, mit einem Dichtelement (127) versehen ist.

15. Isolationssystem nach einem oder mehreren der vorhergehenden Ansprüche, bei dem der Befestigungsring (81) von wenigstens zwei im Wesentlichen gleichen Teilen gebildet ist, die aneinander durch tangentiale Klemmschrauben (83; 85) befestigt sind.

16. Isolationssystem nach einem oder mehreren der vorhergehenden Ansprüche, bei dem die Isolationsplatten (51) so strukturiert und bemessen sind, dass sie so angeordnet werden können, dass sie sich längs der radialen Kanten gegenseitig teilweise überlappen.

17. Yankee-Zylinder (2), der eine Zylinderhülle (11), zwei Endköpfe (13; 15) und Trag- und Rotationsstrukturen (3) umfasst, die sich von den Endköpfen radial nach außen erstrecken, wobei der Zylinder (2) an jedem seiner Endköpfe (13; 15) ein Isolationssystem gemäß einem oder mehreren der vorhergehenden Ansprüche umfasst.

Revendications

1. Une isolation pour les culasses (13,15) d'un cylindre frictionneur (2), comprenant :

   une pluralité de panneaux d'isolation;
   un anneaux d'ancrage (81) subdivisé en au mois deux portions (81A) et engageable à une structure de support et rotation du (3) cylindre frictionneur, ledit anneau d'ancrage en présentant des organes d'ancrage (88) pour assujettir chacun desdits panneaux d'isolation dans une première position radialement plus intérieur;
   pour chaque panneaux d'isolation (51), au moins un élément d'ancrage intermédiaire (91), formé pour être assujetti à au moins une tête de vis (111) présente sur la culasse (13,15) du cylindre frictionneur (2) à une distance radiale de ladite structure de support de rotation (3), ledit élément d'ancrage intermédiaire (91) en définissent au moins un point d'ancrage pour le panneau d'isolation respectif.

2. Isolation selon la revendication 1, où lesdites organes d'ancrage (88) pour assujettir chacun desdits panneaux d'isolation (51) audit anneau d'ancrage (81) dans une première position radialement plus intérieur ce sont des organe à vis.

3. Isolation selon la revendication 1 ou 2, où sur chaque panneau d'isolation (51) de développe radialement au-delà dudit au moins un point d'ancrage et présente un appui terminal, pou s'appuyer à la culasse (31,15) du cylindre frictionneur (21) sur la quelle est installée l'isolation.

4. Isolation selon la revendication 1 ou 2 ou 3, comprenant en outre, pour chacun desdits éléments d'ancrage intermédiaire (91), un organe d'engagement réciproque entre l'élément d'ancrage intermédiaire (91) et le panneau d'isolation respectif (51), configuré pour permettre déformations thermiques différentielles du panneau d'isolation (51) par rapport à la culasse (13,15).

5. Isolation selon la revendication 4, où : ledit organe d'engagement comprenant, pour chaque un point d'ancrage, une vis (111) qui peut être engagée dans un trou fileté (107,109) dudit organe d'engagement et un dispositif autobloquant (112) ; et chaque panneau d'isolation (51) présente, en correspondance de chaque point de ancrage, un trou pour la passage de la vis respective (111) ledit trou en ayant une dimension diamétralement (D) supérieure à la dimension diamétrale (D) de la tige de la vis passante à travers celui-ci, pour permettre une dilatation thermique différente entre le panneau d'isolation (51) et l'élément intermédiaire d'ancrage (91).

6. Isolation selon la revendication 5, où ledit dispositif autobloquant comprend des organe autobloquants interagissant avec le êtes (111A) de deux desdites vis adjacentes.

7. Isolation selon une ou plusieurs des revendication précédentes, où chacun desdits éléments de ancrage intermédiaires (91) comprennent un premier dispositif de serrage à vis avec un premier logement (99) engageable à une tête d'une vis (25) sur la culasse du cylindre frictionneur (2), où au mois quelques-uns desdits éléments d'ancrage intermédiaire (91) comprennent un premier dispositif se serrage à vis avec un deuxième logement (101) engageable à une tête d'une vis (23) sur la culasse du cylindre frictionneur (2), et où au mois quelques-uns desdits éléments d'ancrage intermédiaire comprennent une tige (93) qui forme lesdits deux dispositifs de serrage à vis, et au moins une première extrémité (95) qui forme ledit point d'ancrage d'un panneau d'isolation (51) respectif.

8. Isolation selon la revendication 7, où chacun desdits éléments de ancrage intermédiaires (91) comprennent une deuxième extrémité (97) qui forme un autre point d'ancrage du panneau d'isolation (51) respectif.

9. Isolation selon la revendication 8 où lesdits panneaux d'isolation (51) présentent chacun deux bords radiaux (53C,53D) et où les deux points d'ancrage du panneau d'isolation (51) à l'élément d'ancrage intermédiaire (91) se trouvent adjacentes aux bords radiaux (53C,53D9 du panneau d'isolation (51).

10. Isolation selon une ou plusieurs des revendication précédentes, où chaque panneau d'isolation (51) comprend : un bord radialement plus interne (53A), en forme d'arc circulaire, équipé de trous pour la passage de vis de blocage (88) au dit anneau d'ancrage (81) ; un bord radialement plus externe (53B) à développement circulaire ; deux bords radiaux (53C,53D) fondamentalement rectilignes, en s'étendant du bord radialement plus interne (53A) au bord radialement plus externe (53B), ledit au moins un point d'ancrage intermédiaire étant en position intermédiaire entre ledit bord radialement plus interne (53A) et ledit bord radialement plus externe (53B).

11. Isolation selon une ou plusieurs des revendication précédentes, où lesdits panneaux d'isolation (51) comprennent une tôle (53) formant un secteur de couronne annulaire, avec un bord radialement plus externe (53B) à développement circulaire,un bord radialement plus interne (53A) à développement circulaire et deux bords radiaux fondamentalement rectilignes (53C,53D) ; et où le long de chacun desdits bords radiaux fondamentalement rectilignes est appliqué un profil (55) respectif qui présente un aile (55B) presque orthogonal à dite tôle, tournée vers la culasse (13,15) où est appliquée l'isolation.

12. Isolation selon la revendication 1 où pour chaque panneau d'isolation (51) un premier profil (55) appliqué le long un premier desdits bords radiaux est en saillie par rapport audit premier bord radial, et un deuxième profil (69) appliqué le long un deuxième desdits bords radiaux est reculé par rapport audit deuxième bord radial ; et où entre le deuxième bord radiale et le deuxième profile sont réalisés des trous passants dans ladite tôle, pour le passage de vis de jonction des bords radiaux de panneaux d'isolation (51) adjacentes entre eux, dites vis de jonction insérées dans des trous passantes d'un premier panneau d'isolation s'engageant dans trous filetés prévus sur le premier profil d'un deuxième panneau d'isolation (51) adjacent.

13. Isolation selon la revendication 11, où le long dit bord radialement plus externe à développement circulaire est appliqué un profil (75) qui présente un aile 875A) presque orthogonal à dite tôle.

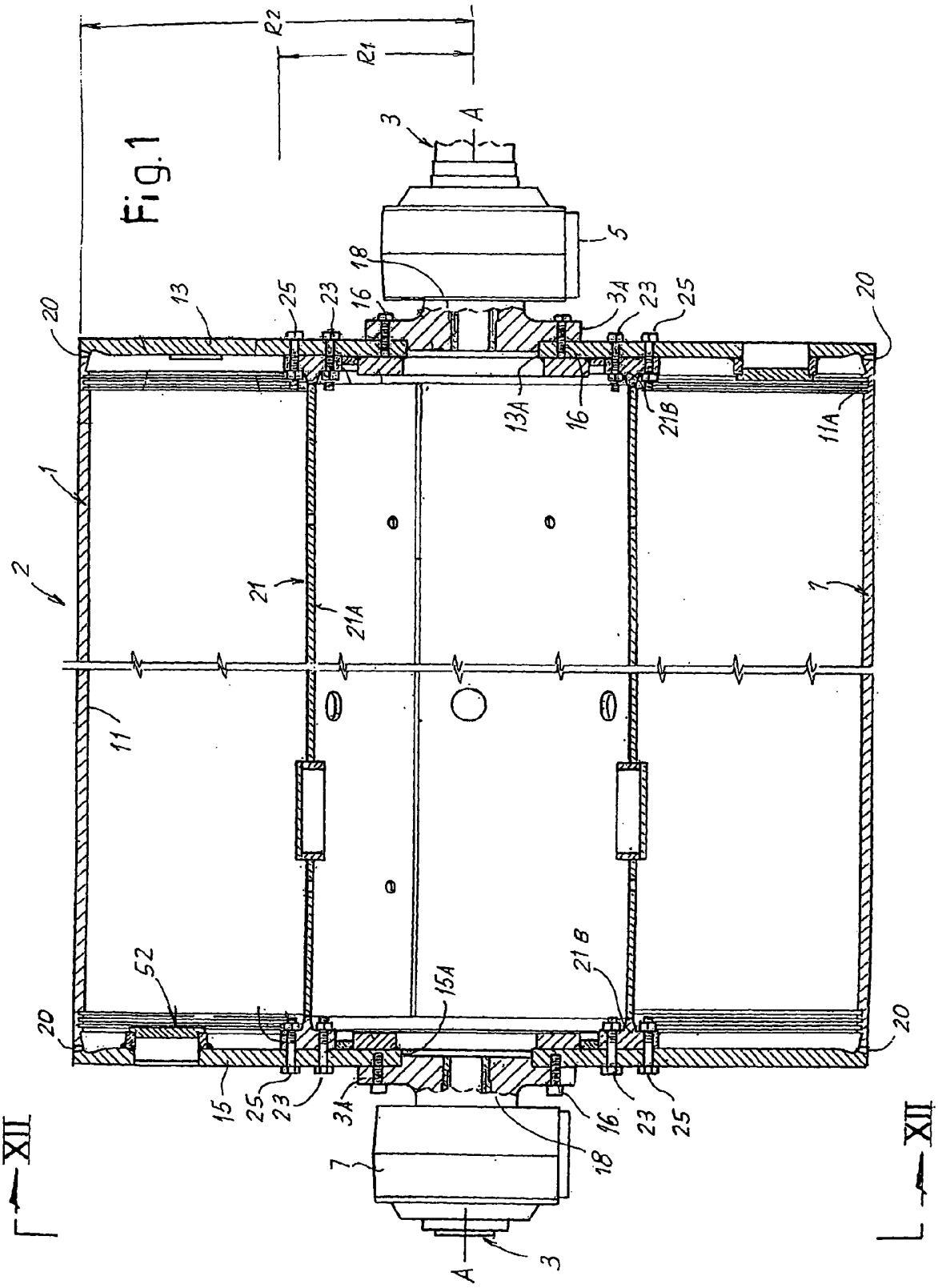
14. Isolation selon la revendication 13, où dit profil (75) appliqué le long du bord radialement plus externe de chaque panneau d'isolation (51) est équipé d'une garniture de tenue (12/9.

15. Isolation selon une ou plusieurs des revendications précédentes, où dit anneau d'ancrage (81) est formé d'au moins deux portions fondamentalement égales, unies entre elles par des vis de serrage tangentiels (83 ;85).

16. Isolation selon une ou plusieurs des revendications précédentes, où dit panneaux d'isolation ont forme et dimension de manière à se disposer entre eux partialement superposés le long des bords radiaux.

17. Un cylindre frictionneur comprenant un manteau cylindrique (11) ; deux culasses (13 ;15) et structures de support et rotation (3) qui s'étendent desdits culasses axialement vers l'extérieur, dit cylindre (2) en comprenant sur chacune desdites culasses (13 ;15) un isolation selon une ou plusieurs des revendications précédentes.

Fig.1


R2
R1
3
A
5
18
20
13
25
23
16
3A
23
25
20
13A
16
21B
11A
1
2
21
21A
7
11
52
21B
15A
20
20
15
25
23
3A
16
23
25
7
18
A
3
XII
XII

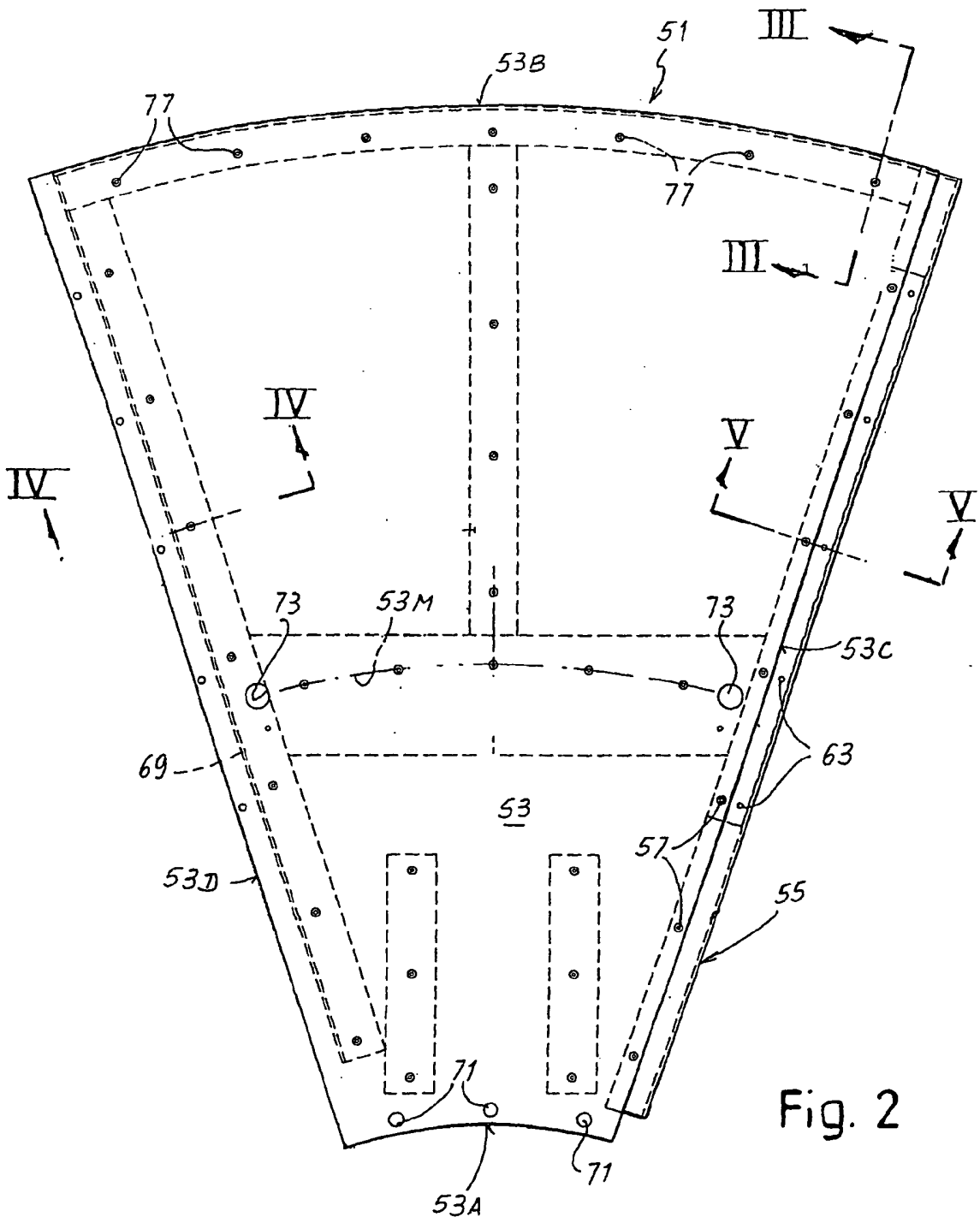

III
51
53B
77
77
III
IV
V
IV
V
73
53M
73
53C
63
69
53
57
53D
55
71
71
53A

Fig. 2

Fig.3

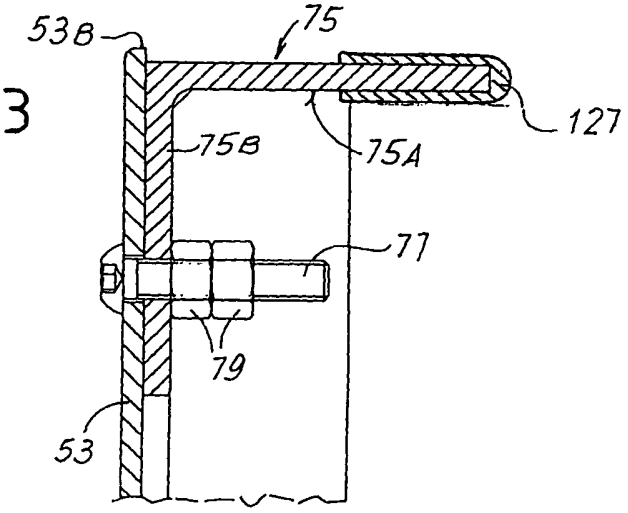


Fig.4

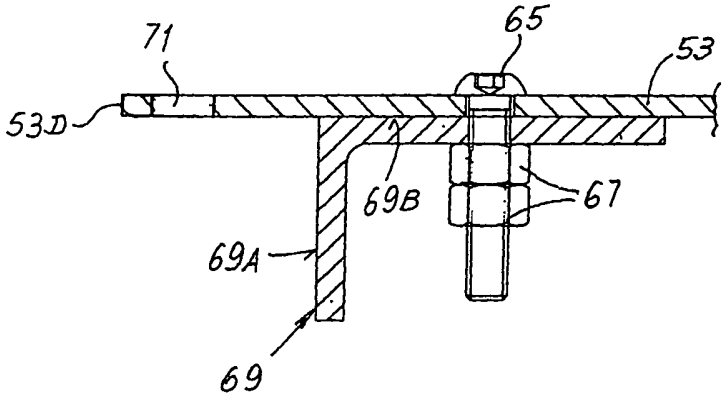
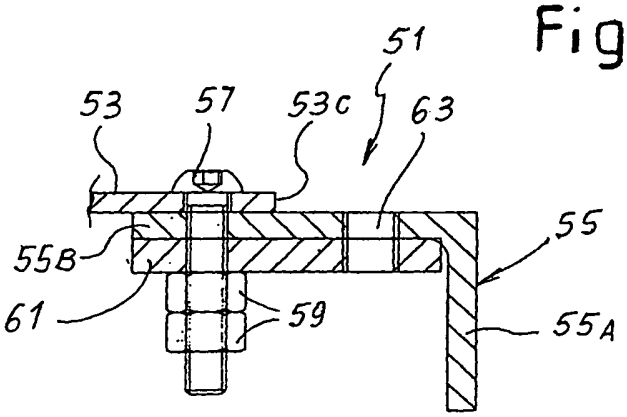


Fig.5



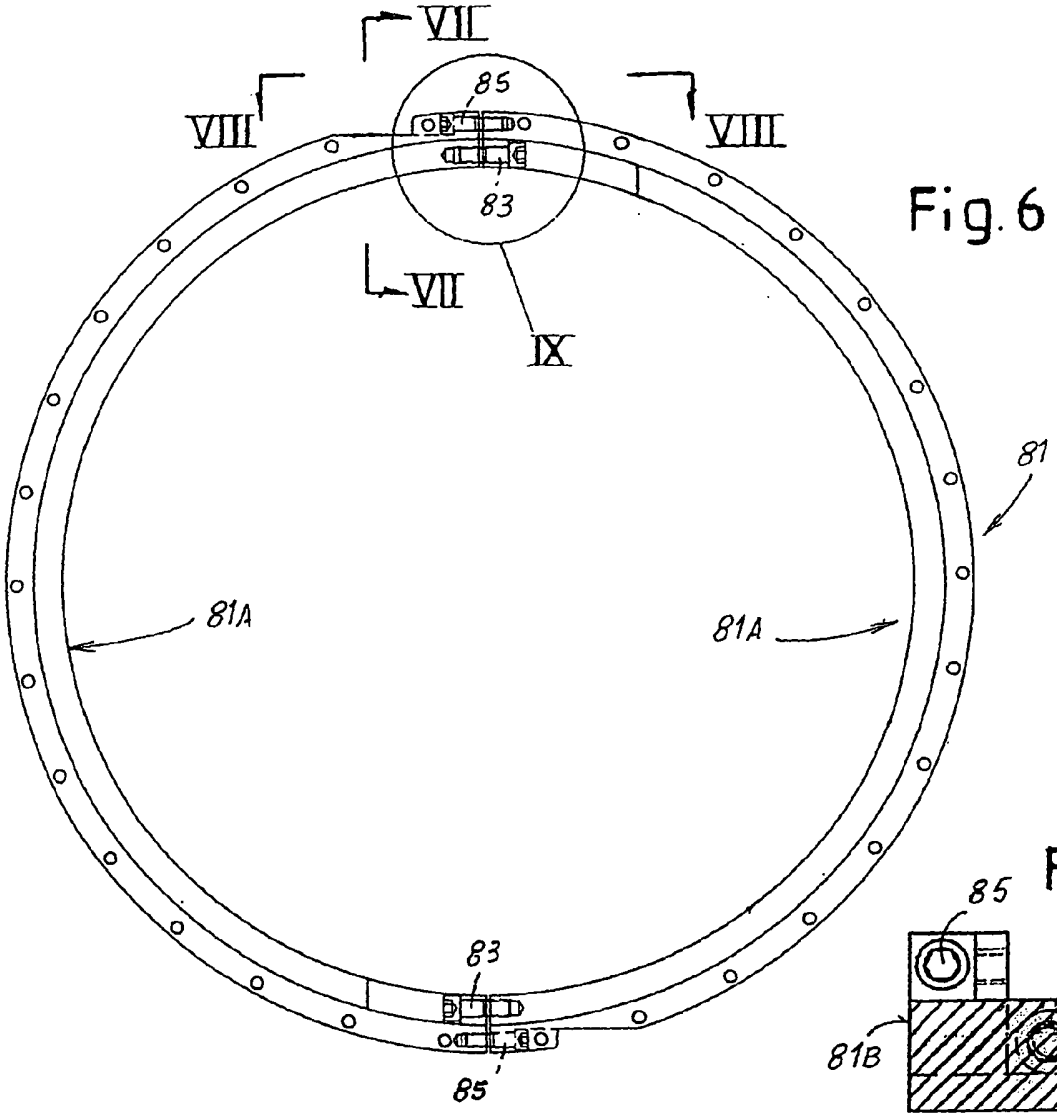


Fig.6

Fig.7

Fig.9

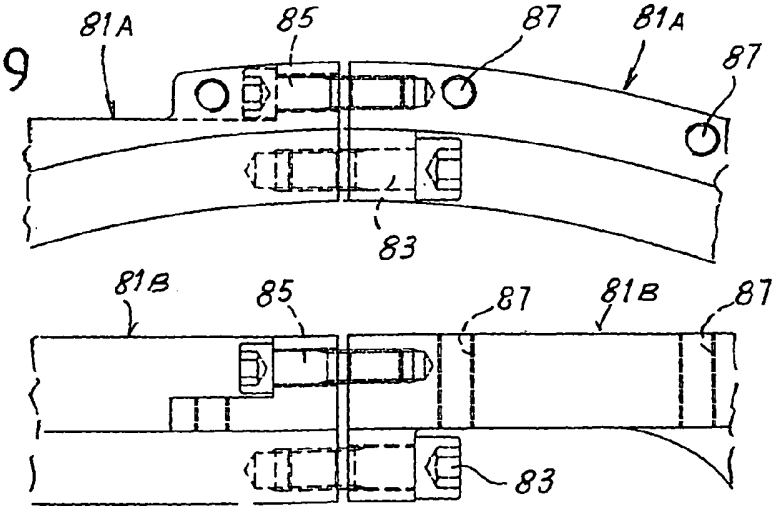


Fig.8

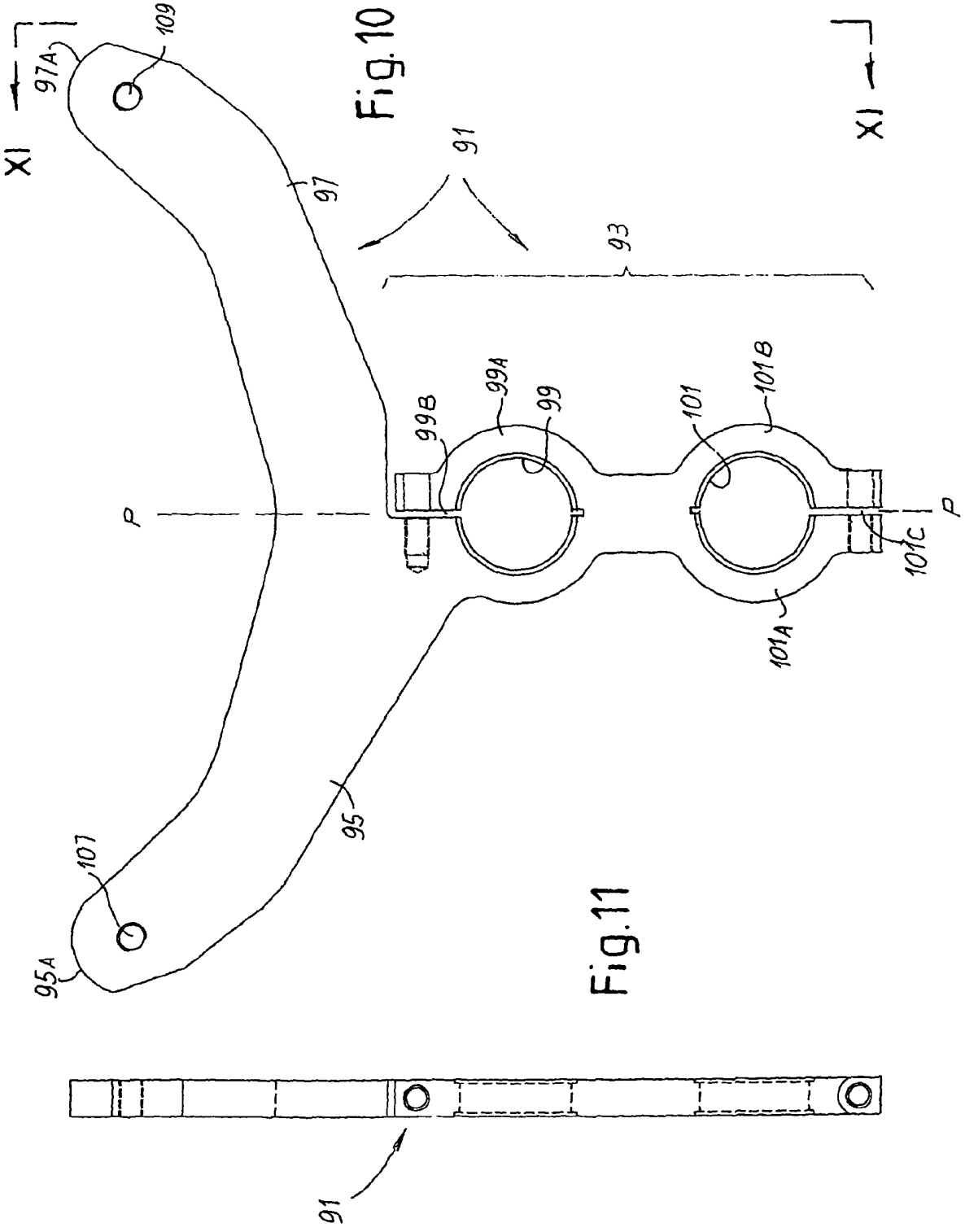
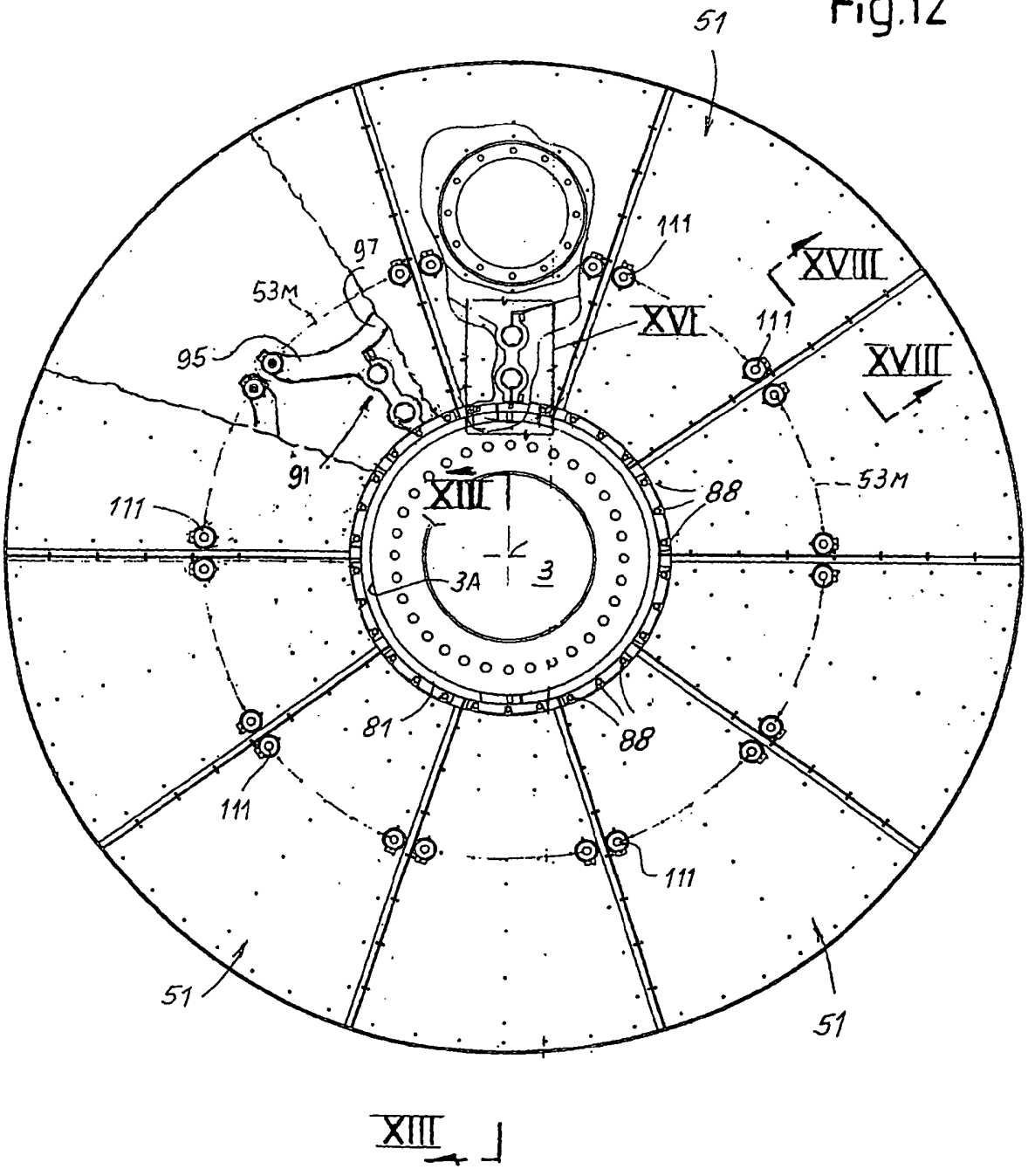

XI
97A
109
97
91
93
XI
99B
99A
99
101
101B
P
P
101C
101A
95
107
95A
91

Fig.10

Fig.11

Fig.12


51
111
97
53м
XVIII
XVI
111
95
XVIII
91
XIII
88
53м
111
3А
3
81
88
111
111
51
51
XIII

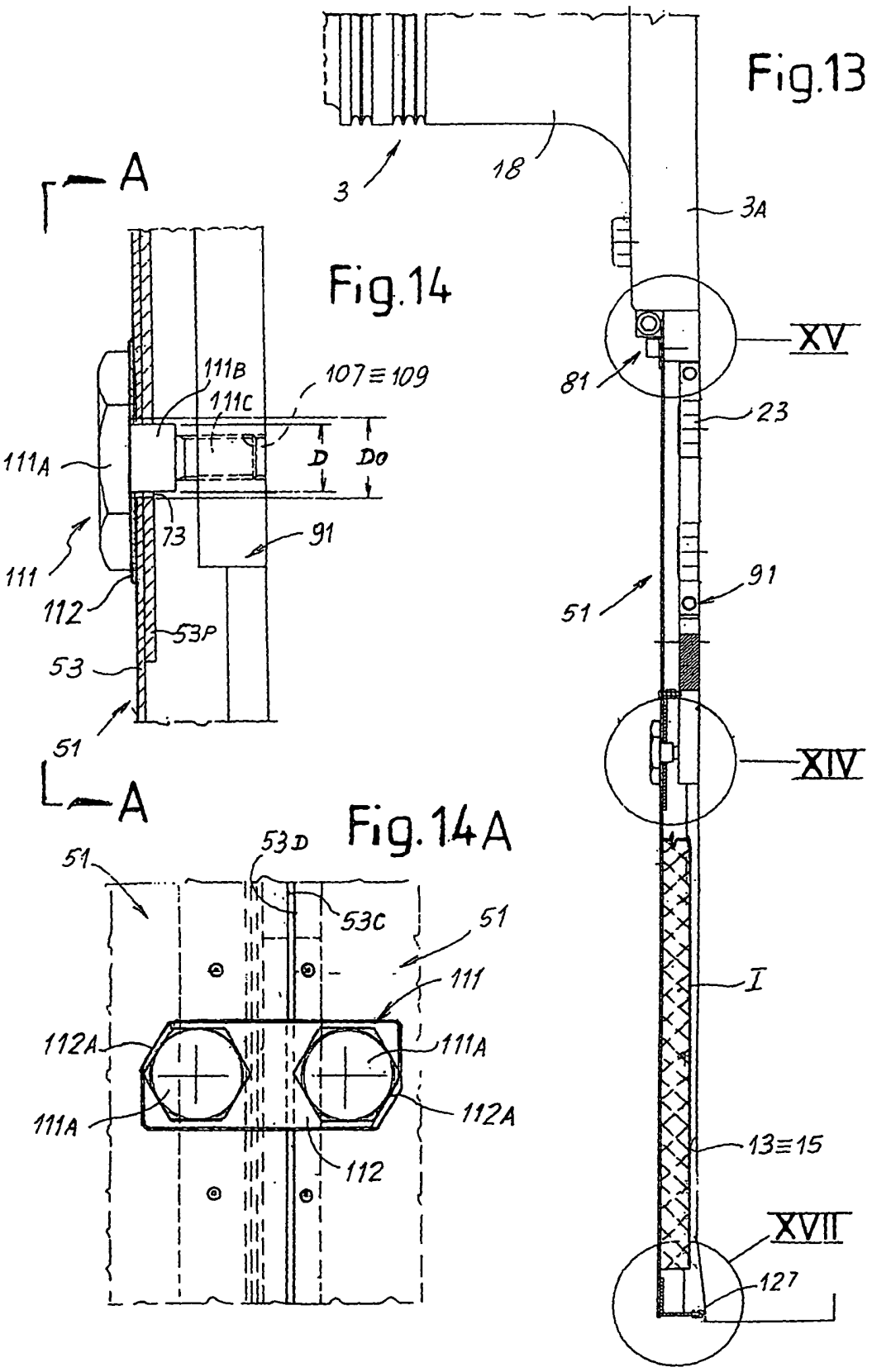


Fig.13

Fig.14

Fig.14A

Fig.15

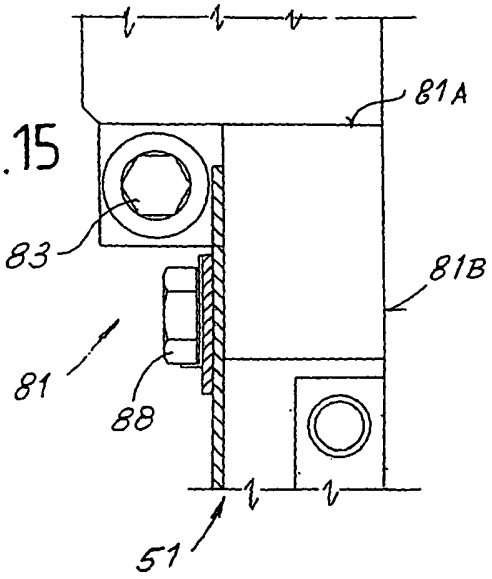


Fig.16

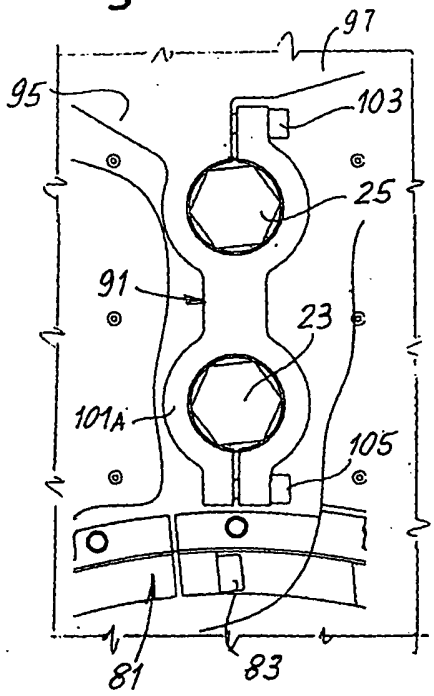
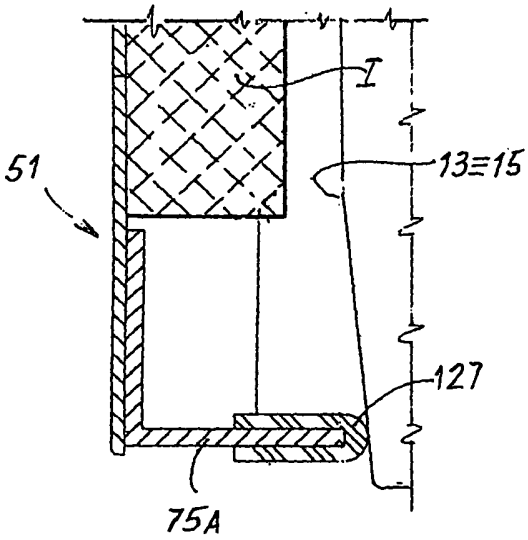


Fig.17



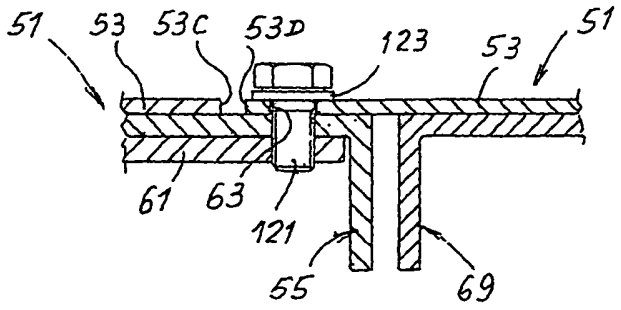


Fig. 18

REFERENCES CITED IN THE DESCRIPTION

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714496/DO

SZIGETELŐ RENDSZER ÖNLEVEVŐ GÉP SZÁRÍTÓHENGERÉHEZ

SZABADALMI IGÉNYPONTOK

1. Szigetelés egy önlevevő gép szárítóhengerének (2) végfejeihez (13, 15), amely szigetelés magában foglal:

- több szigetelőlemezt (51);

- egy rögzítőgyűrűt (81), amely legalább két részre (81A) van osztva, és összekapcsolható az önlevevő gép szárítóhengerének egy tartó és forgó szerkezetével (3), amely rögzítőgyűrű rögzítőelemekkel (88) rendelkezik, hogy mindegyik szigetelőlemezt egy első sugárirányú belső helyzetbe kényszerítve tartsák;

- mindegyik szigetelőlemezhez (51) legalább egy közbenső rögzítőelemet (91), amely úgy van kialakítva, hogy egy, az önlevevő gép szárítóhengerének (2) végfején (13; 15) a tartó és forgó szerkezettől (3) sugárirányú távolságban lévő csavar (111) legalább egy fejéhez legyen kényszerítve, amely közbenső rögzítőelem (91) meghatároz legalább egy rögzítési pontot az adott szigetelőlemez (51) számára.

2. Az 1. igénypont szerinti szigetelés, amelyben a rögzítőelemek (88) csavarelemek, amelyek mindegyik szigetelőlemezt (51) egy első sugárirányú belső helyzetben a rögzítőgyűrűhöz (81) szorítják.

3. Az 1. vagy a 2. igénypont szerinti szigetelés, amelyben mindegyik szigetelőlemez (51) sugárirányban túlnyúlik a legalább egy rögzítési ponton, és van egy végtámaszuk az önlevevő gép szárítóhengerének (2) azon végfején (13; 15) való felfekvésre, amelyhez a szigetelés hozzá van szerelve.

4. Az 1. vagy a 2. vagy a 3. igénypont szerinti szigetelés, ahol mindegyik közbenső rögzítőelemhez (91) magában foglal egy egymáshoz szorító elemet is a közbenső rögzítőelem (91) és az adott szigetelőlemez (51) között, amely szorítóelem úgy van kialakítva, hogy lehetővé tegye a szigetelőlemeznek (51) a végfejhez (13; 15) viszonyított differenciális termikus alakváltozásait.

5. A 4. igénypont szerinti szigetelés, amelyben a szorítóelem mindegyik rögzítési ponthoz magában foglal egy, a szorítóelem menetes furatába (107; 109) beilleszthető csavart (111) és egy önzáró eszközt (112); továbbá mindegyik szigetelőlemeznek (51) mindegyik rögzítési ponton van egy furata az adott csavar (111) áthaladása számára, amely furat átmérőmérete (DO) nagyobb, mint a rajta áthaladó csavar (111) szárának átmérőmérete (D), hogy lehető legyen az eltérő hőtágulás a szigetelőlemez (51) és a közbenső rögzítőelem (91) között.

6. Az 5. igénypont szerinti szigetelés, amelyben az önzáró eszköz (112) önzáró

elemeket foglal magában, amelyek kölcsönhatásban állnak a két szomszédos csavar fejeivel (111A).

7. Az előző igénypontok egyike vagy azok közül több szerinti szigetelés, amelyben mindegyik közbenső rögzítőelem (91) magában foglal egy első csavaros szorítóeszközt egy első üléssel (99), amely összeilleszthető egy, az önlevevő gép szárítóhengerének (2) végfején lévő csavar (25) fejével, továbbá a közbenső rögzítőelemek (91) közül legalább néhány magában foglal egy második csavaros szorítóeszközt egy második üléssel (101), amely összeilleszthető egy, az önlevevő gép szárítóhengerének végfején lévő csavar (23) fejével, azonkívül a közbenső rögzítőelemek közül legalább néhány magában foglal egy, a két csavaros szorítóeszközt képező szárat (93) és legalább egy első nyúlványt (95), amely az adott szigetelőlemeznek (51) a legalább egy rögzítési pontját képezi.

8. A 7. igénypont szerinti szigetelés, amelyben a közbenső rögzítőelemek (91) közül legalább néhány magában foglal egy második nyúlványt (97), amely az adott szigetelőlemeznek (51) egy további rögzítési pontját képezi.

9. A 8. igénypont szerinti szigetelés, amelyben a szigetelőlemezek (51) mindegyikének van két sugárirányú széle (53C, 53D), és amelyben a szigetelőlemez (51) két rögzítési pontja, amelyeken a közbenső rögzítőelemhez (91) van rögzítve, a szigetelőlemez (51) sugárirányú szélei (53C, 53D) mellett helyezkednek el.

10. Az előző igénypontok egyike vagy azok közül több szerinti szigetelés, amelyben mindegyik szigetelőlemez (51) magában foglal: egy körív kiterjedésű, sugárirányú belső szélet (53A), amely el van látva furatokkal rögzítőcsavarok (88) áthaladása számára a rögzítőgyűrűhöz (81); egy kör alakban kiterjedő, sugárirányú külső szélet (53B); két, lényegében egyenesek által határolt, sugárirányú szélet (53C, 53D), amelyek a sugárirányú belső széltől (53A) a sugárirányú külső szélig (53B) terjednek ki, továbbá a legalább egy közbenső rögzítési pont egy közbenső helyzetben van a sugárirányú belső szél (53A) és a sugárirányú külső szél (53B) között.

11. Az előző igénypontok egyike vagy azok közül több szerinti szigetelés, amelyben a szigetelőlemezek (51) magukban foglalnak egy kör alakú gyűrű szegmensét képező lemezt (53), amelynek van egy kör alakban kiterjedő, sugárirányú külső széle (53B), egy kör alakban kiterjedő, sugárirányú belső széle (53A) és két, lényegében egyenesek által határolt, sugárirányú széle (53C, 53D), továbbá mindkét, lényegében sugárirányú, egyenesek által határolt szél mentén egy-egy profil (55) van rögzítve, amelyeknek van egy, a lemezre nagyjából merőleges szárnyuk (55B), amelyek azzal a végfejjel (13; 15) szemben vannak, amelyhez a szigetelés hozzá van szerelve.

12. A 11. igénypont szerinti szigetelés, amelyben mindegyik szigetelőlemez (51) számára egy, a sugárirányú szélek közül az első mentén szerelt első profil (55) az első sugárirányú szélhez képest kiáll, és egy, a sugárirányú szélek közül a második mentén szerelt második profil (69) a második sugárirányú szélhez képest vissza van tolva; és

amelyben a második sugárirányú szél és a második profil között a lemezben átmenő furatok vannak kialakítva az egymással szomszédos szigetelőlemezek (51) sugárirányú széleihez tartozó kötőcsavarok áthaladása számára, és ezek a kötőcsavarok, amelyek egy első szigetelőlemeznek (51) az átmenő furataiba vannak helyezve, egy második, szomszédos szigetelőlemeznek (51) az első profilján lévő menetes furatokba illeszkednek.

13. A 11. igénypont szerinti szigetelés, amelyben a kör alakban kiterjedő, sugárirányú külső szél mentén egy profil (75) van szerelve, amelynek van egy, a lemezre nagyjából merőleges szárnya (75A).

14. A 13. igénypont szerinti szigetelés, amelyben a valamennyi szigetelőlemez (51) sugárirányú külső széle mentén szerelt profil (75) el van látva egy tömítéssel (127).

15. Az előző igénypontok egyike vagy azok közül több szerinti szigetelés, amelyben a rögzítőgyűrűt (81) legalább két, lényegében egyforma rész képezi, amelyeket érintőirányú szorítócsavarok (83; 85) kötnek egymáshoz.

16. Az előző igénypontok egyike vagy azok közül több szerinti szigetelés, amelyben a szigetelőlemezeknek (51) olyan a szerkezete és úgy vannak méretezve, hogy részben egymást átfedően lehessen őket elhelyezni a sugárirányú szélek mentén.

17. Önlevevő gép szárítóhengerének (2), amely magában foglal egy henger alakú héjat (11), két végfejet (13, 15) és a végfejektől tengelyirányban kifelé kiterjedő tartó és forgó szerkezeteket (3), amely henger (2) mindkét végfejen (13, 15) magában foglal egy, az előző igénypontok egyike vagy azok közül több szerinti szigetelést.

(A meghatalmazott)

Mészárosné Dóczy Katalin
szabadalmi ügyvivő
SBGK Szabadalmi Ügyvivői Iroda
[illegible]