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(72) Inventor: **Kallionpää, Marko Juha**
FI-20900 Turku (FI)

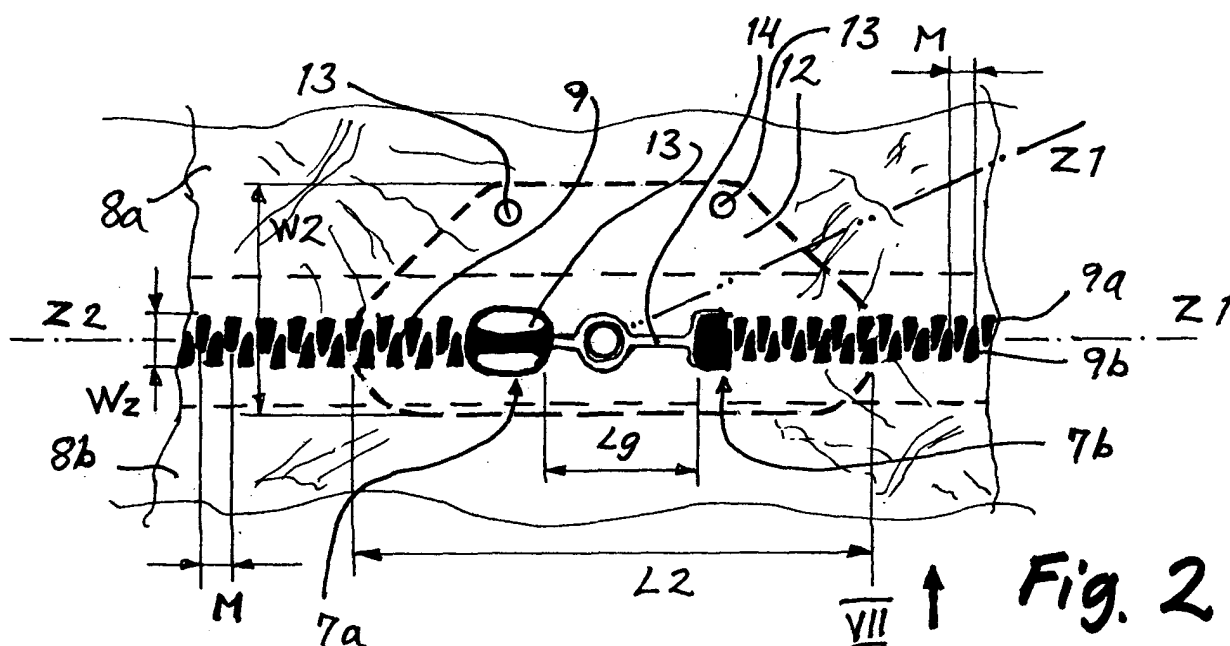
(74) Representative: **Laako, Tero Jussi**
Berggren Oy Ab
P.O. Box 16
00101 Helsinki (FI)

(71) Applicant: **Ursuk Oy**
20521 Turku (FI)

(54) **Closure for Zipper Ends**

(57) The invention concerns a closure for zipper ends (7a, 7b) of liquid or gas tight zipper(s) (9). The closure (1) comprises a first plate (11) and a second plate (12), a sealing ring (2) of an elastomeric material disposed between said first and second plate, a clamp (10) for tightening said first plate (11) and said second plate (12) towards each other. The sealing surface of said sealing ring has at least a continuous inner loop-ridge (3a), at least a continuous outer loop-ridge (3b), and at least first join-ridges (4a), each of which bridging two

points of said outer loop-ridge (3b). The sealing surface also has a first groove (5a) between said inner loop-ridge and said outer loop-ridge together with said first join-ridges, and second grooves (5b) between said first join-ridges and said outer loop-ridge. The sealing ring (2) is seated on said first plate (11) in a position, where said loop-ridges together with said join-ridges are to press at least against said chains of zipper(s), and said loop-ridges are to press against said sheet material portions.



Description

FIELD OF THE INVENTION

[0001] The invention relates a closure for zipper ends of at least one liquid or gas tight zipper. The zipper or zippers is/are used for connecting at least two sheet material portions so that they can be taken apart if wanted. The closure comprises two plates capable to cover the zipper ends, when said sheet material portions with the zipper(s) are between said plates, a sealing ring of an elastomeric material, and a clamp for tightening said plates towards each other, whereupon the sealing ring seals against the sheet material portions and said zipper(s)

BACKGROUND OF THE INVENTION

[0002] Patent publication US 2,753,609 discloses a double slide fastener sealing closure, which include a reinforcing member or an insert of metal or other resilient material positioned in the extremity of the sealing strip for the nest thereof. The nest receives the diamond of the slider, whereupon the outer periphery of the diamond has an improved fluid-tight contact with the nest, while the angular tips of the nest spring back towards each other behind the diamond. Patent publication US 4,604,775 discloses an alternative fluid-tight sealing slide fastener, which includes a pair of rows of coupling elements mounted respectively on inner opposite edges of a stringer tape, an elastomeric top stop mounted on the stringer tape around a terminal opening at ends of the rows of coupling elements, and a slider for taking the rows of coupling elements into and out of intermeshing engagement. The slider includes a slider body having a pair of upper and lower plates interconnected by a diamond, a presser having a plurality of pins extending through the upper plate, and a screw having a threaded shank threaded in a cylindrical body on the upper plate of the slider body and a head acting on the presser. When the slide fastener is closed and the screw is tightened, the pins are pressed against the top stop which is resiliently pressed against the lower plate and the diamond of the slider body to provide fluid-tight sealing between the top stop and the slider. These sealing constructions may provide an acceptable sealing at the first end of one zipper, where the slider is when the zipper is closed. These sealing constructions do not, however, show how the opposite second end of one zipper can be sealed. Patent publication US 4,782,563 discloses an end stop for slide fasteners, which include a rectangular block molded on a portion of folded inner longitudinal tape edges including a plurality of coupling elements mounted thereon, and an integral peripheral seat attached to opposed stringer tapes. The block has an end wall engageable with the slider, and a recess extending in the end wall and defined by and between the block and a portion of the peripheral seat. The portion

of the peripheral seat terminates slightly short of the end wall of the block with the result that the slider is brought into abutment with the block without interference with the peripheral seat. The recess serves to absorb shock force which would otherwise be transmitted directly to the peripheral seat when the slider impinges on the block. Accordingly, this publication describes the sealing construction for the above-mentioned second end of the zipper. These publications concern zippers that keep the portions of the sheet material they connect and disconnect permanently attached to each other, i.e. the sheet material extends around the mentioned second end of the zipper as a single piece of material. The zippers do not allow separation of the sheet material portions attached to the opposite longitudinal sides of the zippers.

[0003] Patent publication US 5,231,736 discloses a cover for the ends of at least one zipper in combination with at least one zipper having ends, comprising: a lower plate and an upper plate between which the ends of at least one zipper may be clamped; a seal disposed between said lower plate and said upper plate said seal being made of an elastomeric material; disengageable connecting means for securing said upper plate to said lower plate, which permits said cover to be completely disassembled and reassembled, said connecting means comprising a screw and a sleeve, and said sleeve being formed as one piece with said lower plate; wherein the ends of the at least one zipper have chains that extend toward each other; said at least one zipper having a zipper slide; wherein said cover which extends toward the zipper chains, is adapted for bridging over and sealing off in a gas tight or liquid tight manner, gaps between the zipper chains that are dimensioned to be large enough to allow the zipper slide to be inserted or removed; by said upper plate, lower plate and said screw being capable of completely covering on both faces the ends of said at least one zipper and said zipper slide; and wherein said at least one zipper has overlapping tapes that extend toward each other or are permanently secured to each other on each side of the chains. This cover construction for zipper ends provide a sealing effect only if very high forces can be attained with the disengageable connecting means for securing said upper plate to said lower plate. Especially zippers with interlocking teeth having upper and/or lower surfaces or surface sections in level(s) different from the tape surfaces and/or above mentioned sheet material surfaces are problematic when sealing is aimed using this cover construction.

SUMMARY OF THE INVENTION

[0004] It is a general object of the invention to provide a closure for the ends of one or more zippers, which ends have a gap therebetween. It is a primary object of the invention to provide such a closure, which seals the area between/around the ends of gas-tight or liquid-tight

zipper or zippers when the zipper(s) are closed, so that no unintended leakage occur through said area from one side to the opposite side, like the inside space and the environment, of flexible sheet material portions connected by said zipper(s). Shortly said, the closure shall provide gas-tight or liquid-tight coverage to the zipper end area. It is a second object of the invention to provide such a closure, which forms a gas-tight or liquid-tight coverage in cases when there is also such discontinuation between one end and the opposite end of the zipper, whereupon the zipper forms a loop, which allows total separation of the flexible sheet material portions from each other. It is a third object of the invention to provide such a closure, which is easy to use by a normal person also in difficult environmental conditions without additional facilities. It is a fourth object of the invention to provide such a closure, which is very reliable. It is a fifth object of the invention to provide such a closure, which is especially suitable for making the ends of zipper(s) in suits and garments water-tight or gas-tight.

[0005] According to the first aspect of the invention it is provided a closure for zipper ends that are terminals of at least one liquid or gas tight zipper, said at least one zipper comprising two chains each adapted to interlock with some other chain by use of a slider, and said chains of the at least one zipper being fixed to at least two sheet material portions for detachable connection thereof, whereupon there is a gap between said ends; said closure comprising: a first plate and a second plate having lengths and widths to cover said zipper ends, when said sheet material portions with said chains of zipper(s) in interlocked state are positioned between said first and second plate; a sealing ring of an elastomeric material disposed between said first and second plate; a clamp for tightening said first plate and said second plate towards each other, said sealing ring against said sheet material portions and said chains of zipper(s). Said sealing ring has a seal length and a seal width to surround said zipper ends, said sealing ring comprising: at least a continuous inner loop-ridge, and at least a continuous outer loop-ridge both extending along said sealing ring; at least first join-ridges, each of which bridging two points of said outer loop-ridge; and a first groove between said inner loop-ridge and said outer loop-ridge together with said first join-ridges, and second grooves between said first join-ridges and said outer loop-ridge; whereupon said sealing ring is seated on said first plate in a position, where said loop-ridges together with said join-ridges are to press at least against said chains of zipper(s), and said loop-ridges within said seal length are to press against said sheet material portions.

[0006] According to the second aspect of the invention said ridges of the sealing ring have a height from bottoms of the grooves and a width between neighboring bottoms of the grooves, whereupon the ratio of said height to said width is between 1:0.7 and 1:2; and/or said ridges with substantially linear sides in cross-section thereof have an acute angle at least 45° and at max-

imum 135°, or at least 60° and at maximum 120°, or between 70° and 110°. This dimensioning prohibits the ridges to fall over or buckle under tightening of the closure, which otherwise could be possible because of the high elasticity of the sealing material.

[0007] According to the third aspect of the invention said elastomeric material of the sealing ring has a hardness at least 5 Shore A and at maximum 30 Shore A, or at least 10 Shore A and at maximum 20 Shore A. Accordingly, the material of the sealing ring has very high elasticity, which provide effective sealing of the zipper chains also in direction of the zippers.

[0008] According to the fourth aspect of the invention chains of the zipper(s) having a chain module the breadths of at least the second and/or fourth grooves are larger than said chain module, but deviates from value attained by multiplying said chain module by an integer. Under these circumstances at least one of the ridges is always in a proper position to make a good seal against the zipper chains.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] The foregoing summary, and the following detailed description of the preferred embodiments of the present invention, will be better understood when read in conjunction with the accompanying drawings, in which:

FIG. 1 represents the inner side of the first half or plate of the closure according to the invention, which inner side with the sealing ring is positioned against the area to be sealed between and around zipper ends, seen in direction V of Figure 3 without sheet material with zipper(s).

FIG. 2 represents the inner side of the second half or plate of the closure according to the invention and the sheet material with zipper or zippers, which inner side with the sealing ring is positioned against the area to be sealed between and around zipper ends, seen in direction VI of Figure 3 with sheet material with zipper(s) in closed state on top of the second half.

FIG. 3 represents one embodiment of the closure according to the invention assembled for use, the sheet material with zipper or zippers between the halves, and the sealing ring pressing against sheet material(s) and zipper chains, in side view in direction VII of Figures 1 and 2.

FIG. 4 represents another embodiment of the closure according to the invention assembled for use, the sheet material with zipper or zippers between the halves, and the sealing ring pressing against sheet material(s) and zipper chains, in the same view as in Figure 3.

FIG. 5 represents the first embodiment of the sealing ring for the closure according to the invention, which sealing ring has two loop-ridges and one pair of join-ridges, in the same view as in Figure 1, in direction perpendicular to the area to be sealed.

FIGS. 6A and 6B represent cross-sections of the sealing ring of Figure 5 along planes I-I and II-II respectively of Figure 5.

FIG. 7 represents the second embodiment of the sealing ring for the closure according to the invention, which sealing ring has three loop-ridges and two pairs of join-ridges, in the same view as in Figure 5, in direction perpendicular to the area to be sealed.

FIGS. 8A and 8B represent cross-sections of the sealing ring of Figure 7 along planes III-III and IV-IV respectively of Figure 7.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0010] Figure 2 shows a combination of two sheet material portions 8a and 8b, which are attached to each other by using either one zipper 9 or two zippers 9. The sheet material portions can be e.g. clothing parts, like water tight or air tight parts of suits or garments, or any other parts of flexible material, like water tight or air tight sections of tents, tarpaulins etc. It shall be understood there can be more than two sheet material portions, and more than two zippers, which are attached to each other so that the portions can be connected to form a continuous product and disconnected whereupon the portions are totally or at least partly off. These at least two sheet material portions 8a, 8b are preferably of a flexible, liquid or gas tight laminate having one or several textile layers, but the sheet material might have also other known or new structure, which provides the necessary degree of tightness for each application or use. The zipper or zippers 9 are also liquid tight or gas tight and have ends 7a, 7b, i.e. terminals, arranged close to each other so that there is a gap Lg between the ends. As an example, in the case of the water tight or gas tight suit or garment the water tight or gas tight zipper 9 extends around the suit from the start end 7b of the zipper to the stop end 7a of the zipper, whereupon the user of the suit can dress and undress the suit when the zipper is open, and the suit is tight when the zipper with the closure according to the invention is closed. When the sheet material portions 8a, 8b have a discontinuation 14 or cut in the area of said gap Lg extending between the ends 7a, 7b of the zipper(s), the sheet material portions can be total separated from each other. The zipper or zippers comprise two chains 9a and 9b each adapted to interlock with some other chain by use of a slider 13, and the chains 9a, 9b of the at least one zipper is fixed to the at

least two sheet material portions 8a and 8b for detachable connection thereof. The zipper(s) 9 can be any known or new construction having good enough tightness properties, high enough strength properties and required use properties, so that the zipper(s) are not explained in detail. Their fixing to the sheet material portions can be made using any known or new material(s) and method, which are not explained in detail. When the sheet material portions are totally separated the line of separation goes between the opposite chains 9a, 9b and along the discontinuation 14, which is between the sheet material portions 8a, 8b. In the embodiment of Fig. 2 the zipper or zippers come to the terminal area, i.e. area between and around the ends 7a, 7b in directions Z1, Z2 parallel to each other, but they can come also in deviating directions or curved route, i.e. non-parallel direction(s) Z1, Z2, shown by phantom line only in the figures. Especially in cases there is further a third end or more ends of the zipper(s) in the terminal area, at least one of the zippers come in deviating or curved direction.

[0011] The closure 1 for sealing the terminal area between and around the zipper ends comprises a first plate 11 and a second plate 12 having lengths L1, L2 and widths W1, W2 to cover said zipper ends 7a, 7b, when the chains 9a, 9b of zipper(s) 9 fixed to the sheet material portions 8a, 8b are in interlocked state, i.e. closed state, and the zipper(s) with their ends together with those parts of the sheet material portions that surround zipper ends are positioned between said first and second plate. The closure 1 also comprise a sealing of an elastomeric material disposed between said first and second plate, and a clamp 10 for tightening the first plate 11 and the second plate 12 towards each other, whereupon the sealing is pressed against the sheet material portions 8a, 8b and the chains 9a, 9b of zipper(s).

[0012] According to the invention the sealing is a sealing ring 2 which has a seal length L4 and a seal width W4, more precisely the inner length and inner width of the sealing ring 2, which seal length and seal width are great enough so that the sealing ring surround said zipper ends, but not run on top of them. With these dimensions the sealing ring sets against the interlocked chains 9a, 9b of the zipper(s) and the outer surface of the sheet material portions 8a, 8b. The sealing ring 2 has also outer length L3 and outer width W3, which are larger than the seal length L4 and the seal width W4 respectively. According to one feature of the invention the sealing ring has a special configuration of that surface, i.e. sealing surface, which seals against chains 9a, 9b and the sheet material portions 8a, 8b. The sealing ring has at least a continuous inner loop-ridge 3a, and at least a continuous outer loop-ridge 3b both extending along said sealing ring, and further at least first join-ridges 4a, each of which bridging two points of said outer loop-ridge 3b. Between the inner loop-ridge 3a and the outer loop-ridge 3b there is a first groove 5a, which continues also between the inner loop-ridge 3a and the first join-ridges 4a. Between the first join-ridges 4a and the outer loop-

ridge 3b there are second grooves 5b. Preferably, the first groove 5a has a first breadth B1 that is maintained between the inner loop-ridge 3a and the outer loop-ridge 3b together with said first join-ridges 4a, i.e. along the whole length of the groove, which extends around the sealing ring 2. Then the second grooves 5b have second breadths B2 that between the outer loop-ridge 3b and the first join-ridges 4a reduce towards the outer loop-ridge, whereupon top edges of all of the ridges continue evenly in the same level without any discontinuation. This first embodiment is the most simple configuration of the sealing surface of the sealing ring 2. In this case the sealing ring 2 is seated on the first plate 11, the ridges and grooves directed away from the first plate in a position, where said loop-ridges together with said join-ridges are to press at least against said chains 9a, 9b of zipper(s) 9, and said loop-ridges are to press against said sheet material portions 8a, 8b. Portions of the sealing periphery having these join-ridges form the zipper-seal-portions P1 of the sealing ring 2.

[0013] The sealing ring 2 can further comprise a continuous outermost loop-ridge 3c extending along said sealing ring, second join-ridges 4b, each of which bridging two points of the outermost loop-ridge 3c. In this case there is, in addition to the first groove 5a described above, between the outer loop-ridge 3b and the outermost loop-ridge 3c a third groove 5c, which continues also between the outer loop-ridge 3b and the second join-ridges 4b. There is, in addition to the second grooves 5b described above, between the second join-ridges 4b and the outermost loop-ridge 3c fourth grooves 5d, too. Here preferably, the third groove 5c has a third breadth B3 that is maintained between said outer loop-ridge 3b and said outermost loop-ridge 3c together with said second join-ridges 4b, i.e. along the whole length of the groove, which extends around the sealing ring 2. The fourth grooves 5d have fourth breadths B4 that between the outermost loop-ridge 3c and the second join-ridges 4b reduce towards the outermost loop-ridge 3c, whereupon top edges of all of the ridges continue evenly in the same level without any discontinuation. This second embodiment is preferred configuration of the sealing surface of the sealing ring 2. Also in this case the sealing ring 2 is seated on said first plate 11, the ridges and grooves directed away from the first plate in a position, where said loop-ridges together with said join-ridges are to press at least against said chains of zipper(s), and said loop-ridges are to press against said sheet material portions. Portions of the sealing periphery having these join-ridges form the zipper-seal-portions P1 of the sealing ring 2.

[0014] When the zipper(s) 9 towards said ends 7a, 7b have parallel directions Z1, Z2 in respect to each other, as visualized in Fig. 2, the sealing ring is practically longitudinal with the seal length L4 and outer length L3 approximately parallel to said directions, and said seal width W4 and outer width W3 is transversal to said directions Z1, Z2. But the main feature here is that the

joint-ridges 4a, 4b present in the zipper-seal-portions P1 of the sealing ring 2 are transversal to said directions Z1, Z2, whereupon there is more ridges — i.e. either three ridges or five ridges according to the embodiment described — to seal against the chains 9a, 9b of the zipper(s) 9, where sealing is a more difficult task than against the sheet material portions 8a, 8b, whereupon ridges of sheet-seal-portions P2 — i.e. either two ridges or three ridges according to the embodiment described — seal against the sheet materials. When the zipper(s) 9 towards said ends 7a, 7b have not parallel directions Z1, Z2 in respect to each other, the general form of the sealing ring 2 can be selected accordingly to be a triangle, or a quadrangle, or a circle, or any other form. Important is that there is in that zipper-seal-portions P1 of the periphery of the form, which is transversal against the direction of zipper chains at that point, the join-ridge or join-ridges together with the loop-ridges so as to have sealing surface configuration with at least three ridges altogether, as described above. Other parts, i.e. sheet-seal-portions P2 of the periphery of the form, which in use provide sealing to the sheet material portions, shall have at least two loop-ridges. All of the ridges shall have top edges on the same level, whereupon the grooves between the loop-ridges form first closed spaces, and the grooves between the loop-ridges and the join-ridges form second closed spaces separate from the first closed spaces in the sealing state of the sealing ring 2. As can be understood the zipper-seal-portions P1 extend from top of the zipper chains to both sides thereof and against sheet materials portions, because the respective outer width W3 is greater than the width Wz of the zipper(s) 9. The sealing ring 2 is preferably on that side of the zipper(s) and sheet material, which contain the liquid or gas against which the sealing shall be effective.

[0015] In order to enhance the sealing effect and the sealing reliability of the sealing ring 2 of the invention the ridges 3a, 3b, 3c, 4a, 4b and the respective grooves 5a to 5d have a specified form in cross-section. The ridges 3a, 3b, 3c, 4a, 4b have a height H1 from bottoms of the grooves 5a to 5d and a width W between neighboring bottoms of the grooves so that the ratio of said height to said width is between 1:0.7 and 1:2. This feature prohibits the falling over or tilting of the ridges when the sealing ring is tightened against the sheet material portions and the zipper chains, and enables compression of the ridges in direction perpendicular to the first and second plates 11, 12 and the sheet material portions and the zipper chains as well. The side surfaces 23 of the ridges can be concave or convex, but it is believed now that linear or almost linear side surfaces 23 are the most effective form, which prohibit tilting or falling over but allows penetration between the teeth of zipper chains 9a, 9b. The form of the side surfaces is evaluated in cross-section perpendicular to the longitudinal direction of the ridges. When the ridge or ridges have these substantially linear side surfaces the side surfaces have an

acute angle K at least 45° and at maximum 135°, or at least 60° and at maximum 120°, or between 70° and 110°. This is at least partly analogous to the height width ratio disclosed above. When there is the height H1 of ridges from the bottoms of the grooves, and the chains 9a, 9b of the zipper(s) 9 has a thickness H2 above the sheet material portions 8a, 8b this height H1 is at least two times the thickness H2. This ensures that there is necessary volume of the elastomeric material of the sealing ring 2, which can be compressed.

[0016] In order to further enhance the sealing effect and the sealing reliability of the sealing ring 2 of the invention the grooves 5a to 5d have specified breadths deviating from the chain dimensions, which are dependent on the spacing between the teeth of zipper chains 9a, 9b in the longitudinal direction of the zippers 9. The chains 9a, 9b of the zipper(s) 9 have a chain module M, i.e. spacing from one tooth to the next tooth in one zipper chain 9a or 9b, whereupon repeating this module with teeth of chains create a continuous zipper chain 9a or 9b. The other zipper chain 9b or 9a for interlocking have the same module M and is also otherwise typically similar. According to the invention the second breadths B2 of the second grooves 5b — both in the first and second embodiment — are larger than the chain module M, but at the same time deviates from value attained by multiplying the chain module M by an integer. Also the fourth breadths B4 of the fourth grooves 5d — in the second embodiment — are larger than the chain module, but deviates from value attained by multiplying the chain module M by an integer. In this alternative embodiment it is preferred that the second breadths B2 deviates from the fourth breadths B4. It is also advantageous that the first breadth B1 and the optional third breadth B3 are larger than the chain module, but deviates from value attained by multiplying the chain module M by an integer. Also this first breadth B1 and this optional third breadth B3 can deviate from each other and also deviate from the second breadths B2 and the fourth breadths B4. By the dimensioning of the breadths it is ensured that at least one of the ridges in the zipper-seal-portions P1 of the sealing ring 2 is in a proper position — when the closure 1 is tightened — for penetration of the sealing ring material into between the teeth of the zipper chains. The sealing ring 2 further comprises troughs 6 on that side adapted for seating against the first plate 11 for controlling the compression of the ridges and for avoidance of ridge tilting. For this purpose the troughs 6 extending opposite said grooves 3a, 3b, 3c; 4a, 4b, when the troughs are rectangular in cross-section. Troughs with other kind of cross-sections can be positioned elsewhere.

[0017] To be really effective the elastomeric material of the sealing ring 2 according to the invention has a hardness at least 5 Shore A and at maximum 30 Shore A, or at least 10 Shore A and at maximum 20 Shore A. Especially hardnesses at or around 10 Shore A have noticed to provide excellent sealing results. The elastomeric

material of the sealing ring 2 can preferably be silicon rubber, but also other synthetic rubbers can be used if they have the right hardness. Best qualities of the rubbers applicable for the sealing ring 2 of the invention have also elongation at least 300%, but generally at least 450%, and good tear strength like 10 kN/m or more.

[0018] The clamp 10 can be a screw nut connection 10a, as shown in Fig. 3, or a bar eccentric connection 10b, as shown in Fig. 4. The precise construction of the clamp can be of any known or new type, and is not described more in detail. The screw or bar is positioned centrally in said first plate 11 and said second plate 12, more precisely in the center of sealing ring 2 so that even pressure is directed to the sealing ring when the clamp tightens the first plate 11 and the second plate 12 towards each other the sheet material portions 8a and 8b with attaching zipper(s) 9 between the second plate 12 and the sealing ring 2. The closure further comprises at least one alignment pin 13 positioned between said first plate 11 and said second plate 12 outside said sealing ring 2, which pin(s) extend through respective hole(s) or into cavity/-ies 15 in the opposite plate, thereby prohibiting twisting of the plates in respect to each other.

Claims

1. A closure for zipper ends (7a, 7b) that are terminals of at least one liquid or gas tight zipper (9), said at least one zipper comprising two chains (9a and 9b) each adapted to interlock with some other chain by use of a slider (13), and said chains of the at least one zipper being fixed to at least two sheet material portions (8a and 8b) for detachable connection thereof, whereupon there is a gap (Lg) between said ends; said closure (1) comprising:

- a first plate (11) and a second plate (12) having lengths (L1, L2) and widths (W1, W2) to cover said zipper ends, when said sheet material portions with said chains of zipper(s) in interlocked state are positioned between said first and second plate;
- a sealing of an elastomeric material disposed between said first and second plate;
- a clamp (10) for tightening said first plate (11) and said second plate (12) towards each other, said sealing against said sheet material portions (8a, 8b) and said chains (9a, 9b) of zipper (s),

characterized in that said sealing is a sealing ring (2) that has a seal length (L4) and a seal width (W4) to surround said zipper ends, said sealing ring comprising:

- at least a continuous inner loop-ridge (3a), and

at least a continuous outer loop-ridge (3b) both extending along said sealing ring;

- at least first join-ridges (4a), each of which bridging two points of said outer loop-ridge (3b); and
- a first groove (5a) between said inner loop-ridge and said outer loop-ridge together with said first join-ridges, and second grooves (5b) between said first join-ridges and said outer loop-ridge; whereupon

said sealing ring (2) is seated on said first plate (11) in a position, where said loop-ridges together with said join-ridges are to press at least against said chains of zipper(s), and said loop-ridges are to press against said sheet material portions.

2. A closure for zipper ends according to claim 1, **characterized in that** said first groove (5a) has a first breadth (B1) maintained between said inner loop-ridge (3a) and said outer loop-ridge (3b) together with said first join-ridges (4a); and that said second grooves (5b) have second breadths (B2) that between said outer loop-ridge (3b) and said first join-ridges (4a) reduce towards said outer loop-ridge.

3. A closure for zipper ends according to claim 1, **characterized in that** said sealing ring (2) further comprises:

- a continuous outermost loop-ridge (3c) extending along said sealing ring;
- second join-ridges (4b), each of which bridging two points of said outermost loop-ridge (3c); and
- a third groove (5c) between said outer loop-ridge and said outermost loop-ridge together with said second join-ridges, and fourth grooves (5d) between said second join-ridges and said outermost loop-ridge, whereupon said sealing ring (2) is seated on said first plate (11) in a position, where said loop-ridges together with said join-ridges are to press at least against said chains of zipper(s), and said loop-ridges are to press against said sheet material portions.

4. A closure for zipper ends according to claim 3, **characterized in that** said third groove (5c) has a third breadth (B3) maintained between said outer loop-ridge (3b) and said outermost loop-ridge (3c) together with said second join-ridges (4b); and that said fourth grooves (5d) have fourth breadths (B4) that between said outermost loop-ridge (3c) and said second join-ridges (4b) reduce towards said outermost loop-ridge.

5. A closure for zipper ends according to claim 1 or 2,

characterized in that said zipper(s) (9) towards said ends (7a, 7b) have parallel or not parallel directions (Z1, Z2) in respect to each other, and said seal width (W4) is transversal to said directions; and that said joint-ridges (4a, 4b) are transversal to said directions (Z1, Z2).

6. A closure for zipper ends according to claim 2, **characterized in that** said chains (9a, 9b) of the zipper (s) (9) having a chain module (M) said second breadths (B2) of the second grooves (5b) are larger than said chain module, but deviates from value attained by multiplying said chain module (M) by an integer.

7. A closure for zipper ends according to claim 4, **characterized in that** said chains (9a, 9b) of the zipper (s) (9) having a chain module (M) said fourth breadths (B4) of the fourth grooves (5d) are larger than said chain module, but deviates from value attained by multiplying said chain module (M) by an integer.

8. A closure for zipper ends according to claim 6 and 7, **characterized in that** said second breadths (B2) deviates from said fourth breadths (B4).

9. A closure for zipper ends according to claim 6 or 7, **characterized in that** said first breadth (B1) and said optional third breadth (B3) are larger than said chain module, but deviates from value attained by multiplying said chain module (M) by an integer.

10. A closure for zipper ends according to any of the preceding claims, **characterized in that** said ridges (3a, 3b, 3c, 4a, 4b) have a height (H1) from bottoms of the grooves (5a to 5d) and a width (W) between neighboring bottoms of the grooves; and that the ratio of said height to said width is between 1:0.7 and 1:2.

11. A closure for zipper ends according to any of the preceding claims, **characterized in that** said ridges (3a, 3b, 3c, 4a, 4b) has a height (H1) from bottoms of the grooves (5a to 5d), said chains (9a, 9b) of the zipper(s) (9) has a thickness (H2) above said sheet material portions (8a, 8b), and said height (H1) is at least two times said thickness (H2).

12. A closure for zipper ends according to any of the preceding claims, **characterized in that** said ridge or ridges with substantially linear sides in cross-section thereof has/have an acute angle (K) at least 45° and at maximum 135°, or at least 60° and at maximum 120°, or between 70° and 110°.

13. A closure for zipper ends according to any of the preceding claims, **characterized in that** said elas-

tomeric material of the sealing ring (2) has a hardness at least 5 Shore A and at maximum 30 Shore A, or at least 10 Shore A and at maximum 20 Shore A.

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14. A closure for zipper ends according to any of the preceding claims, **characterized in that** said clamp (10) is a screw nut connection (10a), or a bar eccentric connection (10b), whereupon said screw or bar is positioned centrally in said first plate (11) and said second plate (12).
15. A closure for zipper ends according to any of the preceding claims, **characterized in that** it further comprises at least one alignment pin (13) positioned between said first plate (11) and said second plate (12) outside said sealing ring (2).
16. A closure for zipper ends according to any of the preceding claims, **characterized in that** said at least two sheet material portions (8a, 8b) are a flexible, liquid or gas tight laminate having one or several textile layers; and that said sheet material portions (8a, 8b) have a discontinuation (14) in the area of said gap (Lg) extending between the ends (7a, 7b) of the zipper(s) allowing total separation of said sheet material portions.

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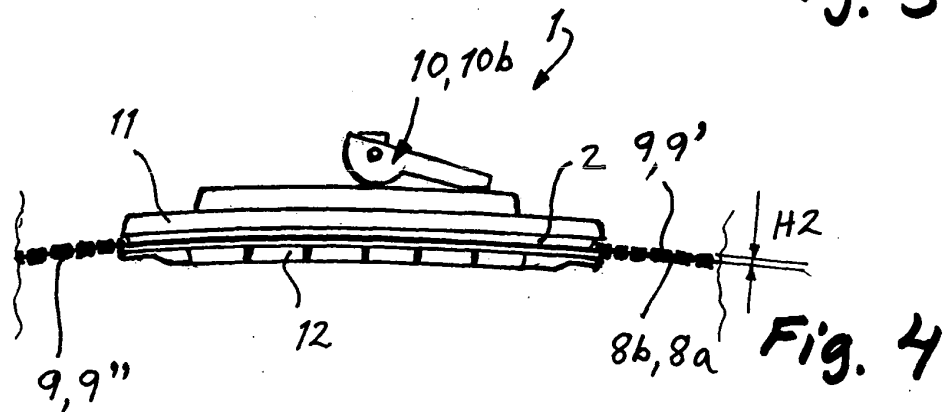
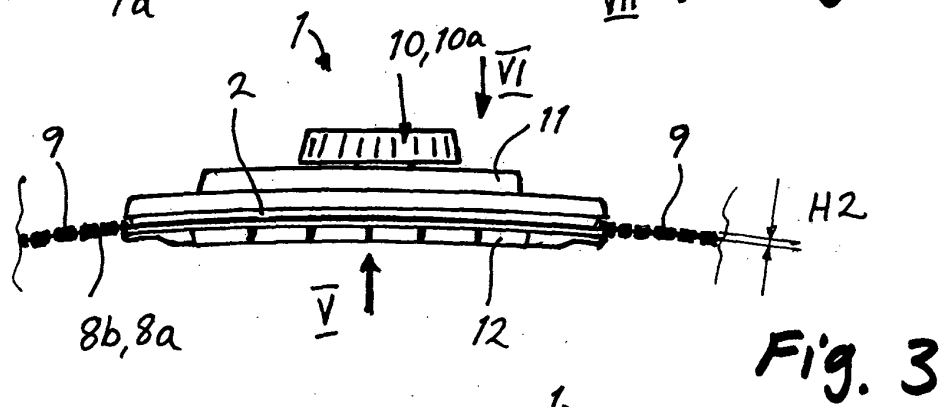
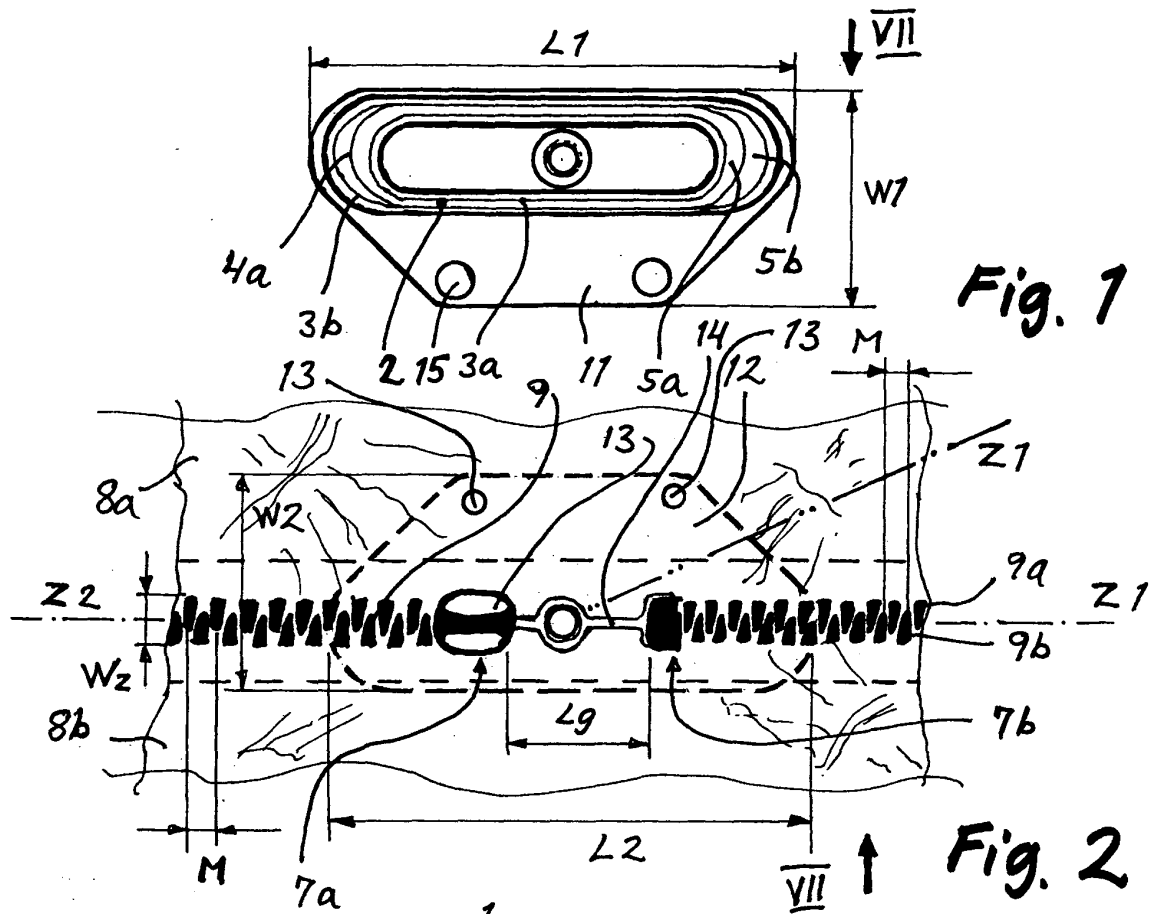
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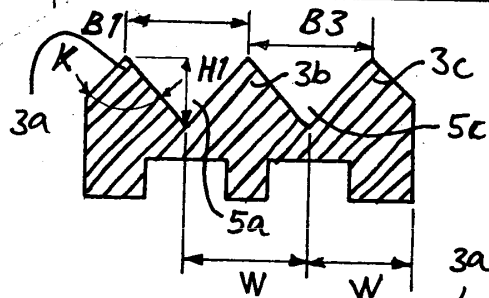
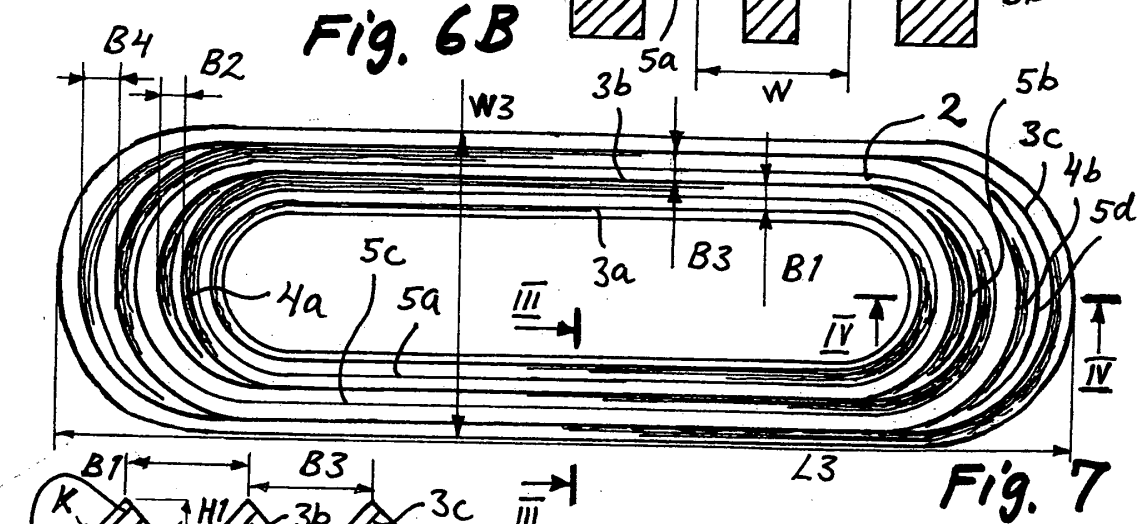
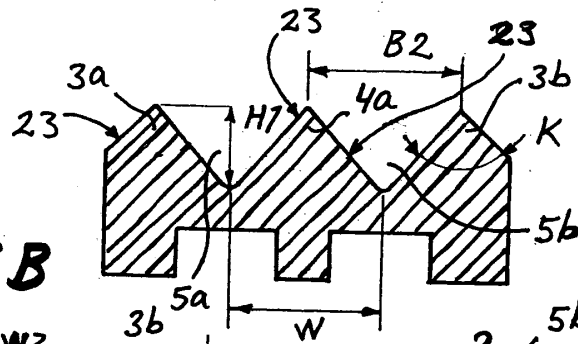
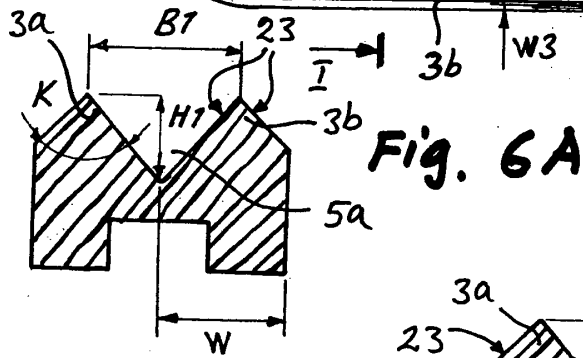
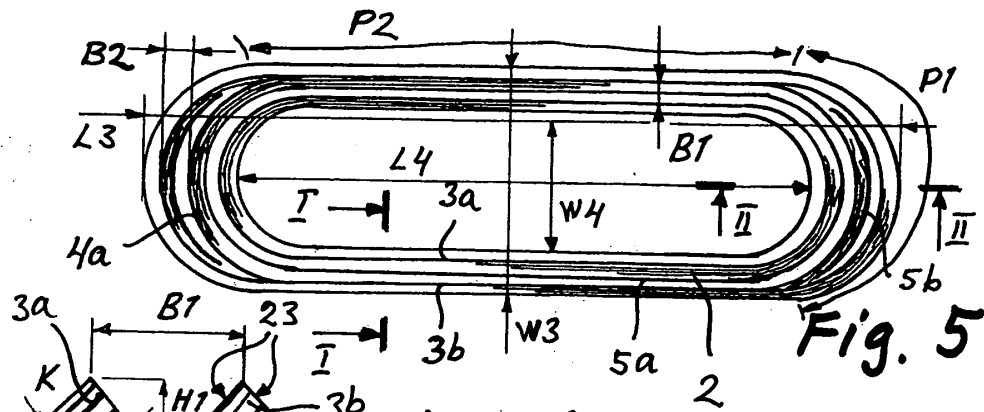


Fig. 8B

