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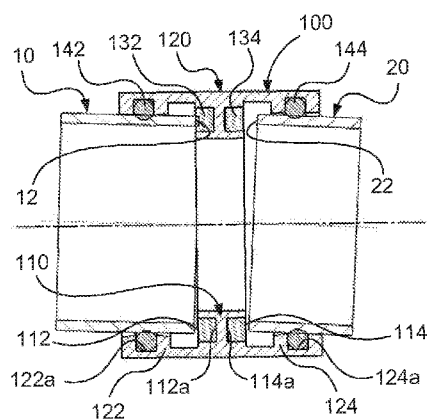


Fig. 1b

(57) Abstract: The present invention concerns a connecting piece (100) for sealingly connecting two pipe sections (10, 20). The connecting piece (100) is designed with a sleeve portion (120) and a flange portion (110). The flange portion (110) is in turn designed with sealing elements (132, 134). In the mounted state, the ends (12, 22) of the pipe sections (10, 20) lie in abutment to the sealing elements (132, 134) of the flange portion (110), which both seal the connection but can also absorb forces associated with mutual movement between the pipe sections (10, 20).

CONNECTING PIECE

TECHNICAL FIELD OF THE INVENTION

The invention concerns a connecting piece according to the preamble to
5 claim 1.

BACKGROUND

When connecting pipes, the problem of how to meet high tolerances of the pipe at the interface often arises. One variant involves connecting such pipes
10 with one another by using a hose and hose clamps. Such a connection by means of a hose and hose clamps can be used on existing pipes, and requires little adaptation of the pipes that are to be connected. One problem with a hose and hose clamps is that it can be difficult to make the connection leaktight, due in part to the fact that it is affected by the temperature.
15 Furthermore, such a connection entails problems in terms of its service life, as the rubber and fabric of which it is made degrade over time and are at risk of disintegrating. Another variant is to use a bellows connector, i.e. to connect the pipe ends by means of a bellows in order to make the connection flexible. However, bellow connectors are relatively expensive and have a
20 relatively short service life.

US5106129 describes an example of an alternative solution in which a connecting piece in the form of a pipe section is used to connect two pipes, wherein the pipe section has radial seals at each end, and wherein the end region of each pipe has a larger diameter in order to both guide the seal
25 axially and not increase the pressure drop across the seal. One disadvantage of such a solution is that the pipes that are to be connected need to have an altered geometry in their end regions, which contributes to increased production cost for the pipe. Furthermore, it entails that existing pipes

wherein, for example, one wishes to replace a hose connection with hose clamps, require the replacement of the entire pipe.

OBJECT OF THE INVENTION

- 5 One object of the present invention is to achieve an improved connecting piece for connecting two pipe sections, particularly one that meets high tolerances for the pipe sections, provides good leaktightness and long service life and enables cost-effective connection.

10 SUMMARY OF THE INVENTION

These and other objects, which are presented in the description below, are achieved by means of a connecting piece of the type specified above that further exhibits the features specified in the characterizing part of the independent claim. Preferred embodiments of the connecting piece are
15 defined in the independent claims.

According to the invention, these objects are achieved by means of a connecting piece for sealingly connecting two pipe sections with mutually opposed end surfaces, and which comprises a flange portion with which said end surfaces of said pipe sections are arranged so as to interwork. This
20 makes it possible to connect the pipe sections with high tolerances and with good sealing without affecting the geometry of the end region of each respective pipe section, which provides a cost-effective connection.

According to one embodiment of the connecting piece, said flange portion is, in the mounted state, arranged in a space between said end surfaces. The
25 connecting piece is thus guided axially. The flange portion enables axial movement of each respective pipe section, independent of the other pipe

section, with the respective end surfaces of each pipe section engaging one another.

According to one embodiment, the connecting piece further comprises a sleeve portion that is connected to said flange portion and arranged so as to
5 sealingly receive said pipe sections. Sealing against the respective pipe sections is facilitated thereby.

According to one embodiment of the connecting piece, said sleeve portion is, in the mounted state, arranged essentially externally on said pipe sections, whereupon said flange portion is arranged internally in said sleeve portion.
10 This makes it possible to maintain essentially corresponding diameters at the connection between the pipe sections in order to minimize the effects of flows through the pipe sections via the connecting piece.

According to one embodiment of the connecting piece, said sleeve portion is, in the mounted state, arranged essentially internally in said pipe pieces,
15 whereupon said flange portion is arranged externally on said sleeve portion. This makes it possible to achieve a compact connection insofar as the connecting piece thus does not need to extend radially over each respective pipe section.

According to one embodiment of the connecting piece, said flange portion is
20 arranged internally and externally on said sleeve portion. Connection of pipe sections with different diameters is thereby facilitated.

According to one embodiment of the connecting piece, said flange portion is arranged essentially centrally viewed in the axial direction of said sleeve portion. Good sealing independent of axial movement of the connecting piece
25 relative to the pipe sections is thereby facilitated.

According to one embodiment of the connecting piece, said flange portion is arranged circumferentially around said sleeve portion. This enables a simple design of the connecting piece.

According to one embodiment of the connecting piece, said flange portion comprises flexible sections with which said end surfaces are arranged so as to interwork. A connection that involves reduced effects from bumping together of the pipe sections with the flange portion is achieved thereby, as is, consequently, reduced wear.

According to one embodiment, the connecting piece comprises sealing elements arranged so as to sealingly interwork with said pipe sections. Effective sealing is thereby achieved.

According to one embodiment of the connecting piece, said sealing elements comprise O-ring elements on said sleeve portion. Effective sealing is thereby achieved.

According to one embodiment of the connecting piece, said sealing elements comprise elements mounted on said sleeve portion by means of vulcanization. Effective sealing is thereby achieved. In addition, the use of a circular cylindrical sleeve portion is enabled without diameter modifications externally or internally in the form of grooves and/or projections, whereupon said elements mounted by means of vulcanization also comprise said flange portion with flexible properties for said cooperation by means of the end surfaces of the pipe sections.

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FIGURE DESCRIPTION

The present invention will be better understood with reference to the following detailed description read together with the accompanying drawings, in which the same reference designations refer to the same parts consistently in the many views, and in which:

25

Fig. 1a schematically illustrates a view in the axial direction of a connecting piece for connecting two pipe sections according to a first embodiment of the present invention;

Fig. 1b schematically illustrates an axial cross-sectional view of the connecting piece in Fig. 1a;

Fig. 2a schematically illustrates a view in the axial direction of a connecting piece for connecting two pipe sections according to a second embodiment of the present invention;

Fig. 2b schematically illustrates an axial cross-sectional view of the connecting piece in Fig. 2a;

Fig. 3a schematically illustrates a view in the axial direction of a connecting piece for connecting two pipe sections according to a third embodiment of the present invention;

Fig. 3b schematically illustrates an axial cross-sectional view of the connecting piece in Fig. 3a;

Fig. 4a schematically illustrates a view in the axial direction of a connecting piece for connecting two pipe sections according to a fourth embodiment of the present invention;

Fig. 4b schematically illustrates an axial cross-sectional view of the connecting piece in Fig. 4a;

Fig. 5 schematically illustrates an axial cross-sectional view of a connecting piece for connecting two pipe sections according to a fifth embodiment of the present invention; and

Fig. 6 schematically illustrates an axial cross-sectional view of a connecting piece for connecting two pipe sections according to a sixth embodiment of the present invention.

DESCRIPTION OF EMBODIMENTS

Fig. 1a schematically illustrates a view in the axial direction of a connecting piece 100 for connecting two pipe sections 10, 20 according to a first embodiment of the present invention, Fig. 1b an axial cross-sectional view A-A of the connecting piece 100 in Fig. 1a.

The connecting piece 100 is arranged so as to connect, mutually sealed and with end surfaces opposing one another, a first pipe section 10 and a second pipe section 20. The first pipe section 10 consequently has an end surface 12 and the second pipe section 20 has an end surface 22.

10 The connecting piece 100 comprises a flange portion 110 with which the respective end surfaces 12, 22 of said pipe sections 10, 20 are arranged so as to interwork. In the mounted state, said flange portion 110 is arranged in a space between said end surface 12, 22. Said flange portion 110 has a first side 112 that is intended to be turned toward said first pipe section 10, and
15 an opposite second side 114 that is intended to be turned toward said second pipe section 20.

The connecting piece 100 further comprises a sleeve portion 120 that is connected to said flange portion and arranged so as to sealingly receive said pipe sections 10, 20. Said flange portion 110 is arranged internally in said
20 sleeve portion 120. Said flange portion 110 is arranged so as to extend from the sleeve portion 120 in the radial direction into said sleeve portion 120. In the mounted state, the sleeve portion 120 is disposed outside of said pipe sections 10, 20, and the flange portion 110 is disposed between the respective end surfaces 12, 22 of said pipe sections 10, 20.

25 Said sleeve portion 120 comprises a first overlapping portion 122 arranged between the edge of the sleeve portion 120 that, in the mounted state, opens onto the first pipe section 10 and the first side 112 of the flange portion 110, and a second overlapping portion 124 arranged between the edge of the sleeve portion 120 that, in the mounted state, opens onto the second pipe

section 20 and the second side 114 of the flange portion 110. Said first overlapping portion 122 is arranged so as, in the mounted state, to externally overlap an end region of the first pipe section 10. Said second overlapping portion 124 is arranged so as, in the mounted state, to externally overlap an
5 end region of the second pipe section 20.

Said flange portion 110 is arranged essentially centrally viewed in the axial direction of said sleeve portion. Said flange portion 110 is internally circumferentially arranged around said sleeve portion 120.

Said flange portion 110 further comprises flexible sections 132, 134 with
10 which said end surfaces 12, 22 of said pipe sections 10, 20 are arranged so as to interwork. Said flexible sections 132, 134 comprise a first damping element 132 arranged on the first side 122 of the flange portion 110 and a second damping element 134 arranged on the second side 144 of the flange portion 110. The first damping element 132 is arranged in a first
15 circumferential groove 112a on the first side 122 and the second damping element 134 is arranged in a second circumferential groove 114a on the second side 114 of the flange portion 110. According to one variant, the first and second damping elements 132, 134 consist of sealing rings such as O-rings. The first damping element 132 is arranged so as to flexibly and
20 dampingly interwork with the end surface 12 of the first pipe section 10. The second damping element 134 is arranged so as to flexibly and dampingly interwork with the end surface 22 of the second pipe section 20.

The connecting piece 100 further comprises sealing elements 142, 144 arranged so as to sealingly interwork with said pipe sections 10, 20. Said
25 sealing elements 142, 144 comprise O-ring elements 142, 144 on said sleeve portion 120. Said sealing elements 142, 144 comprise a first O-ring element 142 arranged so as to sealingly interwork with said first pipe section 10 and a second O-ring element 144 arranged so as to sealingly interwork with said second pipe section 20.

The first O-ring element 142 is arranged in an internal groove 122a in the first overlapping portion 122 of the sleeve portion 120. The second O-ring element 144 is arranged in an internal groove 142a in the second overlapping portion 124 of the sleeve portion 120. The first O-ring element 142 is arranged so as to seal against the first pipe section 10. The second O-ring element 144 is arranged so as to seal against the second pipe section 20.

Fig. 2a schematically illustrates a view in the axial direction of a connecting piece 200 for connecting two pipe sections 10, 20 according to a second embodiment of the present invention, Fig. 2b an axial cross-sectional view A-A of the connecting piece 200 in Fig. 2a.

The connecting piece 200 according to the second embodiment illustrated in Fig. 2a-b differs from the connecting piece 100 according to the first embodiment in Fig. 1a-b in terms of the design of said flexible elements of the flange portion 210 and said sealing elements.

The connecting piece 200 according to the second embodiment comprises element 230 mounted by means of vulcanization. Said element 230 is mounted internally in the sleeve portion 220 of the connecting piece 200. Said element 230 constitutes a flexible layer. The element 230 is preferably made of an elastic material, such as rubber. According to one embodiment, the element 230 is made of fluorine rubber.

According to this embodiment, said element 230 comprises said flange portion 210 with which the respective end surfaces 12, 22 of said pipe sections 10, 20 are arranged so as to interwork. A part of the element 230 thus consists of the flange portion 210. Said flange portion 210 has a first side 212 intended to be turned toward said first pipe section 10 in the mounted state, and an opposite second side 214 intended to be turned toward said second pipe section 20 in the mounted state. Said flange portion 210 is arranged essentially centrally as viewed in the axial direction of said

sleeve portion 220. Said flange portion 210 is internally circumferentially arranged around said sleeve portion 220. In the mounted state, said flange portion 210 is disposed in a space between said end surfaces 12, 22.

Said element 230 mounted internally in the sleeve portion 220 is flexibly
5 configured. Because said flange portion 210 constitutes a part of said element 230, the flange portion 210 also consists of flexible sections 212, 214 in the form of said sides 212, 214 with which said end surfaces are arranged so as to interwork. Said flange portion 210 is thus flexibly
10 configured so that, consequently, said first side 212 of the flange portion 210 flexibly and dampingly interworks with said first pipe section 10, and said second side 214 of the flange portion 210 flexibly and dampingly interworks with said second pipe section 20.

Said sleeve portion 220 also comprises a first 222 and a second 224 overlapping portion. The first 222 overlapping portion is arranged between
15 the end of the sleeve portion 220 that, in the mounted state, opens onto the first pipe section 10 and the first side 212 of the flange portion 210. The second 224 overlapping portion is arranged between the end of the sleeve portion 220 that, in the mounted state, opens onto the second pipe section 20 and the second side 214 of the flange portion 210.

20 According to this embodiment, said element 230 comprises said sealing elements 232, 234. The sealing elements 232, 234 thus constitute a part of said element 230. Said sealing elements 232, 234 comprise a first sealing element 232 arranged so as to sealingly interworky with said first pipe section 10 and a second sealing element 234 arranged so as to sealingly interwork
25 with said second pipe section 20.

The first sealing element 232 is arranged internally in the sleeve portion 220 as a part of the element 230. The second sealing element 234 is arranged internally in the sleeve portion 220 that is a part of the element 230. The first sealing element 232 is arranged so as, in the mounted state, to seal against

the first pipe section 10. The second sealing element 234 is arranged so as, in the mounted state, to seal against the second pipe section 20. The first sealing element 232 consists of a circumferential inwardly arching projection 232 on the first overlapping portion 222. The second sealing element 234
5 consists of a circumferential inwardly arching projection 234 on the second overlapping portion 224.

The element 230 is described here as a unit, but one skilled in the art will perceive that the various parts that constitute the element 230, e.g. the flange portion and the overlapping portions, can be fabricated as separate parts.
10 These parts can then be combined into a unit that is vulcanized on the sleeve portion 220, or they can be vulcanized as separate parts.

Fig. 3a schematically illustrates a view in the axial direction of a connecting piece 300 for connecting two pipe sections according to a third embodiment of the present invention, Fig. 3b an axial cross-sectional view A-A of the
15 connecting piece 300 in Fig. 3a.

The connecting piece 300 according to the third embodiment illustrated in Fig. 3a-b differs from the connecting piece 100 according to the first embodiment in Fig. 1a-b in that a sleeve portion 320 is, in the mounted state, arranged essentially internally in said pipe sections 10, 20, whereupon a
20 flange portion 310 is, in the mounted state, arranged externally on said sleeve portion 320.

Said flange portion 310 is, in the mounted state, thus disposed in a space between said end surfaces 12, 22 of said pipe sections 10, 20. Said flange portion 310 is externally circumferentially arranged around said sleeve
25 portion 320. Said flange portion 310 is arranged essentially centrally viewed in the axial direction of said sleeve portion 320. Said flange portion 310 has a first side 312 that, in the mounted state, is intended to be turned toward said first pipe section 10 and an opposing second side 314 that is, in the mounted state, intended to be turned toward said second pipe section 20.

Said sleeve portion 320 is, in the mounted state, disposed essentially internally in said pipe sections 10, 20, and said flange portion 310 is, in the mounted state, arranged essentially externally on said sleeve portion 320. Said flange portion 310 is consequently arranged so as to extend outward in
5 the radial direction from the sleeve portion 320 so as, in the mounted state, to run between the end surfaces 12, 22 of said pipe sections 10, 20.

Said sleeve portion 320 comprises a first overlapping portion 322 arranged between the edge of the sleeve portion 320 that, in the mounted state, opens onto the first pipe section 10 and the first side 312 of the flange portion 310,
10 and a second overlapping portion 324 between the edge of the sleeve portion 320 that, in the mounted state, opens onto the second pipe section 20 and the second side 314 of the flange portion 310. Said first overlapping portion 322 is arranged so as to internally overlap the end region of the first pipe section 10. Said second overlapping portion 324 is arranged so as to
15 internally overlap an end region of the second pipe section 20.

According to the embodiment in Fig. 1a-b, said flange portion 310 comprises flexible sections 332, 334 with which said end surfaces 12, 22 are, in the mounted state, arranged so as to interwork. Said flexible sections 332, 334 comprise a first damping element 332 arranged on the first side 312 of the
20 flange portion 310 and a second damping element 334 arranged on the second side 314 of the flange portion 310. The first damping element 332 is arranged in a first circumferential groove 312a on the first side 312, and the second damping element 334 is arranged in a second circumferential groove 314a on the second side 314 of the flange portion 310. According to one
25 variant, the first and second damping elements 332, 334 consist of sealing rings in the form of O-rings. The first damping element 332 is arranged so as to flexibly and dampingly interwork with the end surface 12 of the first pipe section 10. The second damping element 334 is arranged so as to flexibly and dampingly interwork with the end surface 22 of the second pipe section
30 20.

According to the embodiment in Fig. 1-b, the connecting piece 300 further comprises sealing elements 342, 344 arranged so as to sealingly interwork with said pipe sections 10, 20. Said sealing elements 342, 344 constitute O-ring elements 342, 344 in said sleeve portion 320. Said sealing elements 342, 344 constitute a first O-ring element 342 arranged so as, in the mounted state, to sealingly interwork with said first pipe section 10, and a second O-ring element 344 arranged so as, in the mounted state, to sealingly interwork with said second pipe section 20.

The first O-ring element 342 is arranged in an internal groove 322a in the first overlapping portion 322 of the sleeve portion 320. The second O-ring element 344 is arranged in an internal groove 324a in the second overlapping portion 324 of the sleeve portion 320.

Fig. 4a schematically illustrates a view in the axial direction of a connecting piece 400 for connecting two pipe sections according to a fourth embodiment of the present invention, Fig. 4b an axial cross-sectional view A-A of the connecting piece 400 in Fig. 4a.

The connecting piece 400 according to the fourth embodiment illustrated in Fig. 4a-b differs from the connecting piece 200 according to the second embodiment in Fig. 2a-b in that a sleeve portion 420 is, in the mounted state, disposed essentially internally in said pipe sections 10, 20, whereupon a flange portion 410 is, in its mounted, state arranged externally on said sleeve portion 420.

The connecting piece 400 according to the fourth embodiment comprises, in a manner consistent with the connecting piece 200 according to the second embodiment, an element 430 mounted by means of vulcanization 430. Said element 430 is thereby mounted externally on the sleeve portion 420 of the connecting piece 400. The element 430 is preferably made of an elastic material, such as rubber. According to one embodiment, the element 430 is made of fluorine rubber.

According to this embodiment, said element 430 comprises said flange portion 410 with which said end surfaces 12, 22 of said pipe sections 10, 20 are, in the mounted state, arranged so as to interwork. Said flange portion 410 has a first side 412 intended, in the mounted state, to be turned toward said first pipe section 10 and an opposing second side 414 intended so as, in the mounted state, to be turned toward said second pipe section 20. Said flange portion 410 is arranged essentially centrally viewed in the axial direction of said sleeve portion 420. Said flange portion 410 is externally circumferentially arranged around said sleeve portion 420. Said flange portion 410 is, in the mounted state, disposed in a space between said end surfaces 12, 22.

Said element 430 is flexibly configured. Because said flange portion 410 constitutes a part of said element 430, the flange portion 410 also consists of flexible sections 412, 414 with which said end surfaces 12, 22 are, in the mounted state, arranged so as to interwork. Said flange portion 410 is thus flexibly configured so that, as a result, said first side 412 of the flange portion 410 flexibly and dampingly interworks with said first pipe section 10, and said second side 414 of the flange portion 410 flexibly and dampingly interworks with said second pipe section 20.

Said sleeve portion 420 also comprises a first 422 and a second 424 overlapping portion. The first 422 overlapping portion is arranged between the end of the sleeve portion that, in the mounted state, opens onto the first pipe section 10 and the first side 412 of the flange portion 410. The second 424 overlapping portion is arranged between the end of the sleeve portion 420 that, in the mounted state, opens onto the second pipe section 20 and the second side 414 of the flange portion 410.

Said element 430 comprises sealing elements 432, 434. Said sealing elements 432, 434 in turn comprise a first sealing element 432 arranged so as, in the mounted state, to sealingly interwork with said first pipe section 10,

and a second sealing element 434 arranged, in the mounted state, so as to sealingly interwork with said second pipe section 20.

The first sealing element 432 is arranged externally around the sleeve portion 420 as a part of the element 430. The second sealing element 434 is arranged externally around the sleeve portion 420 as a part of the element 430. The first sealing element 432 is arranged so as, in the mounted state, to seal against the first pipe section 10. The second sealing element 434 is arranged so as, in the mounted state, to seal against the second pipe section 20. The first sealing element 432 consists of a circumferential outwardly arching projection 432 in the region of the first overlapping portion 422. The second sealing element 434 consists of a circumferential outwardly arching projection 434 in the region of the second overlapping portion 424.

The element 430 is described here as a unit, but one skilled in the art will perceive that the various parts that constitute the element 430, e.g. the flange portion and the overlapping portions, can be fabricated as separate parts. These parts can then be combined into a unit that is vulcanized on the sleeve portion 420, or they can be vulcanized as separate parts.

Fig. 5 schematically illustrates an axial cross-sectional view of a connecting piece 500 for connecting two pipe sections 10, 20 according to a fifth embodiment of the present invention.

The connecting piece 500 according to the fifth embodiment illustrated in Fig. 5 differs from the connecting piece 100 according to the first embodiment in Fig. 1a-b and the connecting piece according to the third embodiment in Fig. 3a-b in that a first part of a sleeve portion 520 is, in the mounted state, arranged essentially internally in the first pipe section 10, and in that a second part of the sleeve portion 520 is, in the mounted state, arranged essentially externally on the second pipe section 20. A first external flange portion 510a is arranged externally on said sleeve portion 520, and a second internal flange portion 510b is arranged internally in said sleeve portion 520.

Said flange portions 510a, b are thus, in the mounted state, disposed in a space between said end surfaces 12, 22 of said pipe sections 10, 20. Said external flange portion 510a is externally circumferentially arranged around said sleeve portion 520. Said internal flange portion 510b is internally circumferentially arranged in said sleeve portion 520. Said flange portions 510a, b are arranged essentially centrally viewed in the axial direction of said sleeve portion 520. Said first flange portion 510a has a first side 512 intended, in the mounted state, to be turned toward said first pipe section 10. Said second flange portion 510b has a second side 514 intended, in the mounted state, to be turned toward said second pipe section 20.

Said sleeve portion 520 comprises a first overlapping portion 522 arranged between the edge of the sleeve portion 520 that, in the mounted state, opens onto the first pipe section 10 and the first side 512 of the first flange portion 510a, and a second overlapping portion 524 between the edge of the sleeve portion that, in the mounted state, opens onto the second pipe section 20 and the second side 514 of the second flange portion 510b. Said first overlapping portion 522 is arranged so as, in the mounted state, to internally overlap an end region of said first pipe section 10. Said second overlapping portion 524 is arranged so as, in the mounted state, to externally overlap an end region of the second pipe section 20.

According to the embodiments in Fig. 1a-b and Fig. 3a-b, said flange portions 510a, b further comprise flexible sections 532, 534 with which said end surfaces 12, 22 are arranged so as to interwork. Said flexible sections 532, 534 comprise a first damping element 532 arranged on the first side 512 of the first flange portion 510a, and a second damping element 534 arranged on the second side 514 of the second flange portion 510b. The first damping element 532 is arranged in a first circumferential groove 512a in the first side 512, and the second damping element 534 is arranged in a second circumferential groove 514a in the second side 514 of the flange portions 510a, b. According to one variant, the first and second damping elements

532, 534 consist of sealing rings in the form of O-rings. The first damping element 532 is arranged so as, in the mounted state, to flexibly and dampingly interwork with the end surface 12 of the first pipe section 10. The second damping element 524 is arranged so as, in the mounted state, to flexibly and dampingly interwork with the end surface 22 of the second pipe section 20.

According to the embodiments in Fig. 1a-b and Fig. 3a-b, the connecting piece 500 further comprises sealing elements 542, 544 arranged so as, in the mounted state, to sealingly interwork with said pipe sections 10, 20. Said sealing elements 542, 544 comprise the O-ring elements 542, 544 in said sleeve portion 520. Said sealing elements 542, 544 comprise a first O-ring element 542 arranged so as, in the mounted state, to sealingly interwork with said first pipe section 10 and a second O-ring element 544 arranged so as, in the mounted state, to sealingly interwork with said second pipe section 20.

The first O-ring element 542 is arranged in an external groove 522a in the first overlapping portion 522 of the sleeve portion 520. The second O-ring element 544 is arranged in an internal groove 524a in the second overlapping portion 524 of the sleeve portion 520.

Fig. 6 schematically illustrates an axial cross-sectional view of a connecting piece 600 for connecting two pipe sections 10, 20 according to a sixth embodiment of the present invention.

The connecting piece 600 according to the sixth embodiment illustrated in Fig. 6 differs from the connecting piece 200 according to the second embodiment in Fig. 2a-b and the connecting piece 400 according to the fourth embodiment in Fig. 4 in that a first part of a sleeve portion 620 is, in the mounted state, arranged essentially internally in the first pipe section 10, and in that a second part of the sleeve portion 620 is, in the mounted state, arranged essentially externally around the second pipe section 20. A first external flange portion 610a is arranged externally around the sleeve portion

620, and a second internal flange portion 610b is arranged internally in said sleeve portion 620.

The connecting piece 600 according to the sixth embodiment comprises, in accordance with the connecting piece 200 according to the second embodiment and the connecting piece 400 according to the fourth
5 embodiment, elements 630a, b that are mounted by means of vulcanization. The elements 630a, b are preferably made of an elastic material, such as rubber. According to one embodiment, the elements 630a, b are made of fluorine rubber.

10 Said flange portions 610a, b are thus, in the mounted state, disposed in a space between said end surfaces 12, 22 of said pipe sections 10, 20. Said external flange portion 610a is externally circumferentially arranged around said sleeve portion 620. Said internal flange portion 610b is internally circumferentially arranged in said sleeve portion 620. Said flange portions
15 610a, b are arranged essentially centrally viewed in the axial direction of said sleeve portion 620. Said first flange portion 610a has a first side 612 intended, in the mounted state, to be turned toward said first pipe section 10, and the second flange portion 610b has a second side 614 intended, in the mounted state, to be turned toward said second pipe section 20.

20 Said sleeve portion 620 also comprises a first 622 and a second 624 overlapping portion. The first overlapping portion 622 is arranged between the end of the sleeve portion 620 that, in the mounted state, opens onto the first pipe section 10 and the first side 612 of the first flange portion 610a. The second overlapping portion 624 is arranged between the end of the sleeve
25 portion 620 that, in the mounted state, opens onto the second pipe section 20 and the second side 614 of the second flange portion 610b. Said first overlapping portion 622 is arranged so as, in the mounted state, to internally overlap an end region of the first pipe section 10. Said second overlapping portion 624 is arranged so as, in the mounted state, to externally overlap an
30 end region of the second pipe section 20.

Said element 630 comprises a first element 630a mounted externally on the first overlapping portion 622 and a second element 630b mounted internally on the second overlapping portion 624 of the sleeve portion 620. The first element 630a is further mounted on and thus constitutes the first side 612 of the first flange portion 610a. The second element 630b is further mounted on and thus constitutes the second side 614 of the second flange portion 610b.

Said elements 630a, b are flexibly configured. Because the first side 612 is comprised in said first element 630a and the second side 614 is comprised by said second element 630b, the flange portions 610a, b comprise flexible sections 612, 614 with which said end surfaces 12, 22 are arranged, in the mounted state, so as to interwork. Said flange portions 610a, b are thus flexibly configured so that said first side 612 of the first flange portion 610a flexibly and dampingly interworks, in the mounted state, with said first pipe section 10, and said second side 614 of the second flange portion 610b flexibly and dampingly interworks, in the mounted state, with said second pipe section 20.

Said elements 630a, b thus comprise said sealing elements 632, 634. The sealing element 632 thus constitutes a part of said first element 630a and the sealing element 634 constitutes a part of said second element 630b. Said sealing elements 632, 634 comprise a first sealing element 632 arranged so as, in the mounted state, to sealingly interwork with said first pipe section 10 and a second sealing element 634 arranged so as, in the mounted state, to sealingly interwork with said second pipe section 20.

The first sealing element 632 is arranged externally around the sleeve portion 620 as a part of the first element 630a. The second sealing element 634 is arranged internally around the sleeve portion 620 as a part of the second element 630b. The first sealing element 632 is arranged so as, in the mounted state, to seal against the first pipe section 10. The second sealing element 634 is arranged so as, in the mounted state, to seal against the second pipe section 20. The first sealing element 632 consists of a

circumferential outwardly arching projection 632 on the first element 630a, and the second sealing element 634 consists of a circumferential inwardly arching projection 634 on the second element 630b.

5 The connecting pieces 500; 600 according to the fifth and sixth embodiments in Figs. 5 and 6 facilitate the connection of pipe sections 10, 20 with different diameters without affecting the geometries of the end regions of the respective pipe sections 10, 20.

10 The flange portion 110; 210; 310; 410; 510a, b; 610a, b according to the foregoing embodiments is arranged so as, during its mounting, to guide the connecting piece 100; 200; 300; 400; 500; 600 axially in that the respective end surfaces 12, 22 of the first and second pipe sections 10, 20 are arranged so as to interwork with the flange portion 110; 210; 310; 410; 510; 610. When the connecting piece is arranged between the pipe sections 10, 20, their respective end surfaces 12, 22 will come to interwork with the flange portion 15 110; 210; 310; 410; 510a, b; 610a, b, thereby providing axial guidance of the pipe sections 10, 20. No adaptation of the end portions 12, 22 of the pipe sections 10, 20 is consequently needed. The flange portion 110; 210; 310; 410; 510a, b; 610a, b can also be designed with flexible sections in the form of sealing elements 132, 134; 232, 234; 332, 334; 442, 444; 532, 534; 632, 20 634, which can absorb forces caused by mutual movement between the pipe sections 10, 20 and reduce the wear on their respective end surfaces 12, 22.

The connecting piece 100; 200; 300; 400; 500; 600 according to the foregoing embodiments can be used to connect any suitable pipe sections in any suitable application. Said connecting pieces are, for example, applicable 25 for connecting pipe sections in so-called EGR loops in vehicles, coolant loops, air loops or the equivalent. According to one embodiment, said sleeve portion 120; 220; 320; 420; 520; 620 is made of a metallic material.

The foregoing description of the preferred embodiments of the present invention has been provided for illustrative and descriptive purposes. It is not

intended to be exhaustive, or to limit the invention to the variants described. Many modifications and variations will obviously be apparent to one skilled in the art. The embodiments have been chosen and described in order to best explicate the principles of the invention and its practical applications, and to

5 thereby enable one skilled in the art to understand the invention in terms of its various embodiments and with the various modifications that are applicable to its intended use.

CLAIMS

1. A connecting piece (100; 200; 300; 400; 500; 600) for connecting two pipe sections (10, 20) mutually sealed and with end surfaces (12, 22), **characterized by** a flange portion (110; 210; 310; 410; 510; 610) with which
5 the respective end surfaces (12, 22) of said pipe sections (10, 20) are arranged so as to interwork.
2. A connecting piece according to claim 1, wherein said flange portion (110; 210; 310; 410; 510a, b; 610a, b) is, in the mounted state, disposed in a space between said end surfaces (12, 22).
- 10 3. A connecting piece according to claim 1 or 2, further comprising a sleeve portion (120; 220; 320; 420; 520; 620) connected with said flange portion (110; 210; 310; 410; 510a, b; 610a, b) arranged so as to seal against said pipe sections (10, 20).
4. A connecting piece according to claim 3, wherein said sleeve portion
15 (120; 220) is arranged, in the mounted state, essentially externally on said pipe sections (10, 20), and wherein said flange portion (110; 210) is arranged internally in said sleeve portion (120; 220).
5. A connecting piece according to claim 3, wherein said sleeve portion (320; 420) is arranged, in the mounted state, essentially internally in said
20 pipe sections (10, 20), and wherein said flange portion (310; 410) is arranged externally on said sleeve portion (320; 420).
6. A connecting piece according to any of claims 3-5, wherein said flange portion (510; 610) is arranged internally and externally on said sleeve portion (520; 620).
- 25 7. A connecting piece according to any of claims 3-6, wherein said flange portion (110; 210; 310; 410; 510a, b; 610a, b) is arranged essentially centrally viewed in the axial direction of said sleeve portion (120; 220; 320; 420; 520; 620).

8. A connecting piece according to any of claims 3-7, wherein said flange portion (110; 210; 310; 410; 510a, b; 610a, b) is circumferentially arranged on said sleeve portion (120; 220; 320; 420; 520; 620).
9. A connecting piece according to any of claims 1-8, wherein said flange portion (110; 210; 310; 410; 510a, b; 610a, b) comprises flexible sections (132, 134; 212, 214; 332, 334; 412, 414; 512, 514; 612, 614) with which said end surfaces (12, 22) are arranged so as to interwork.
10. A connecting piece according to any of claims 1-9, comprising sealing elements (142, 144; 232, 234; 342, 344; 432, 434, 542, 544; 632, 634) arranged so as to sealingly interwork with said pipe sections.
11. A connecting piece according to claim 10, wherein said sealing elements comprise O-ring elements (142, 144; 342, 344; 542, 544) on said sleeve portion (120; 320; 520).
12. A connecting piece according to claim 10, wherein said sealing elements comprise elements (232, 234; 432, 434; 632, 634) mounted on said sleeve portion (220; 420; 620) by means of vulcanization.

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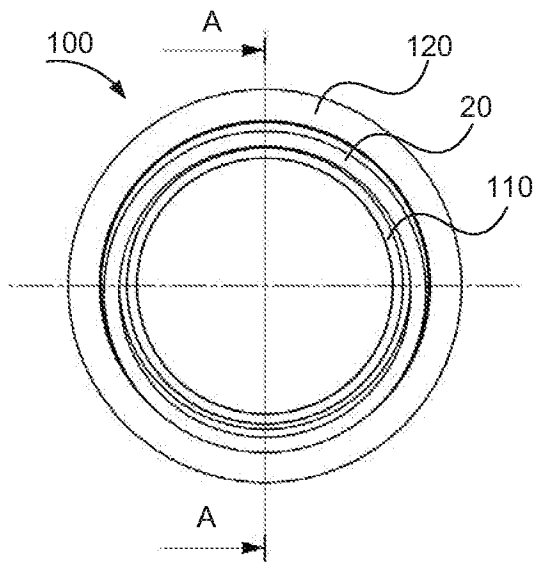


Fig. 1a

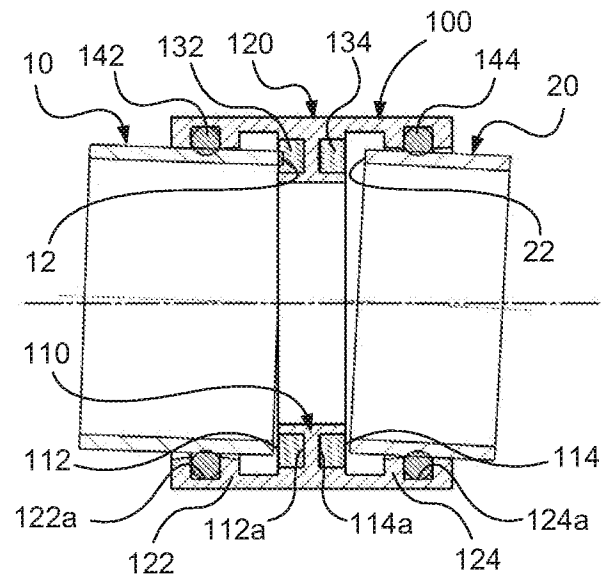


Fig. 1b

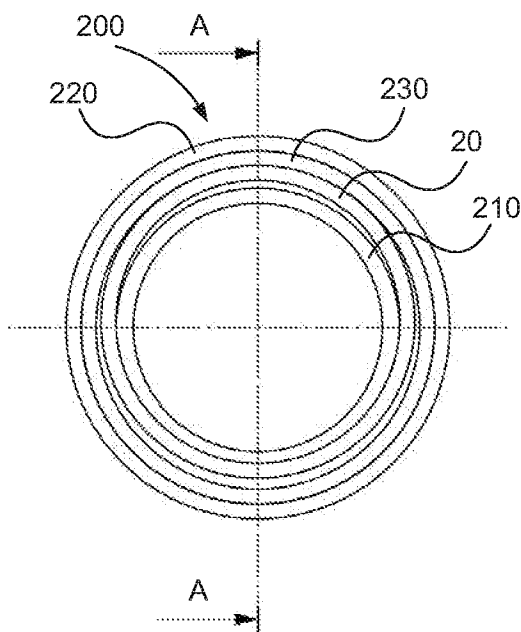


Fig. 2a

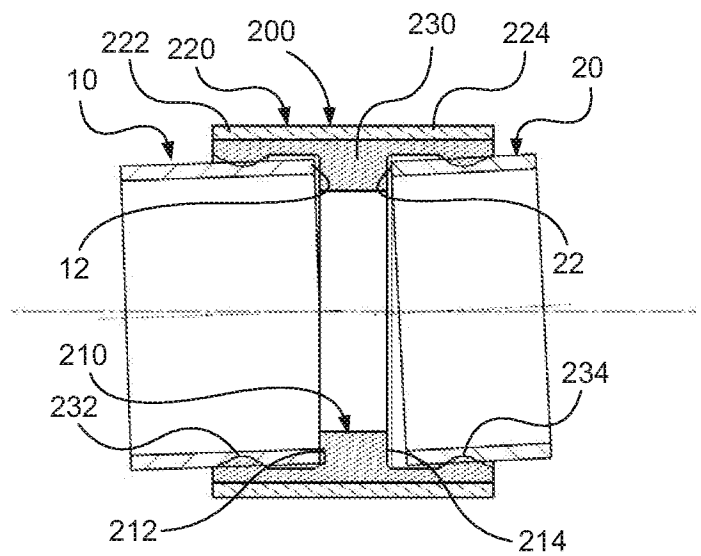


Fig. 2b

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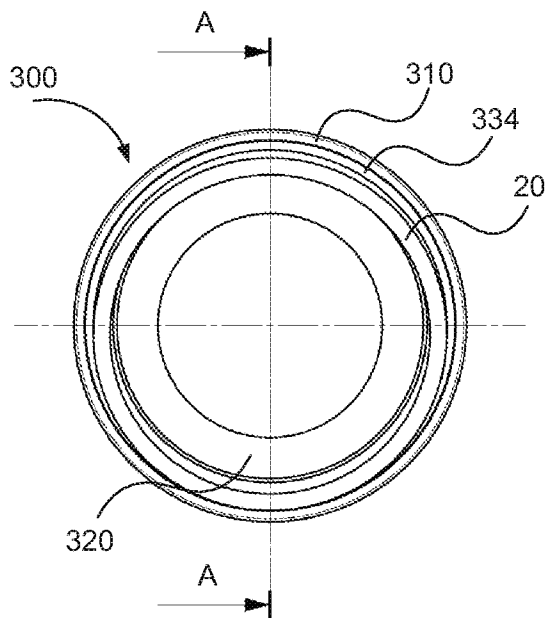


Fig. 3a

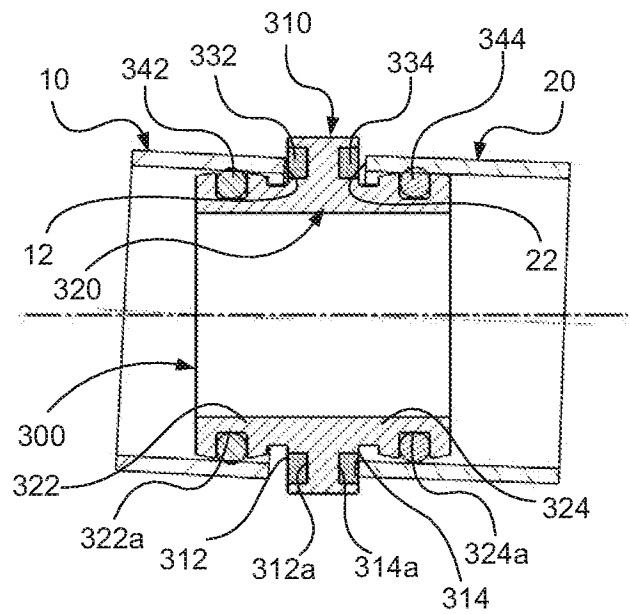


Fig. 3b

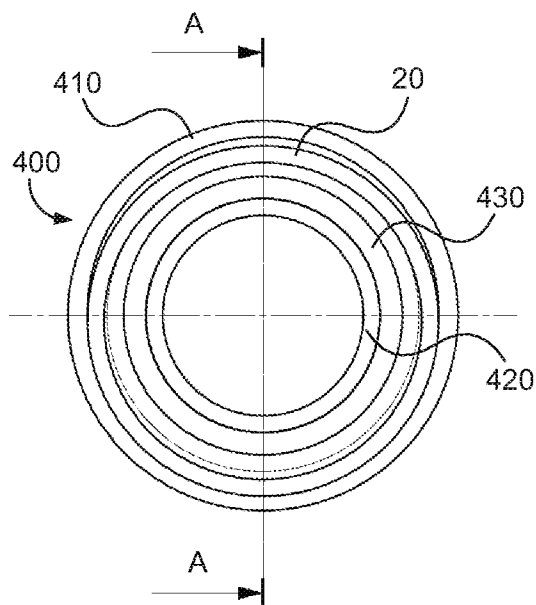


Fig. 4a

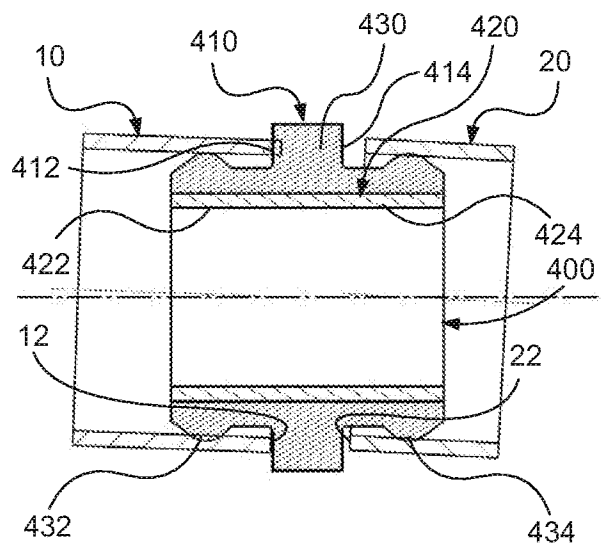


Fig. 4b

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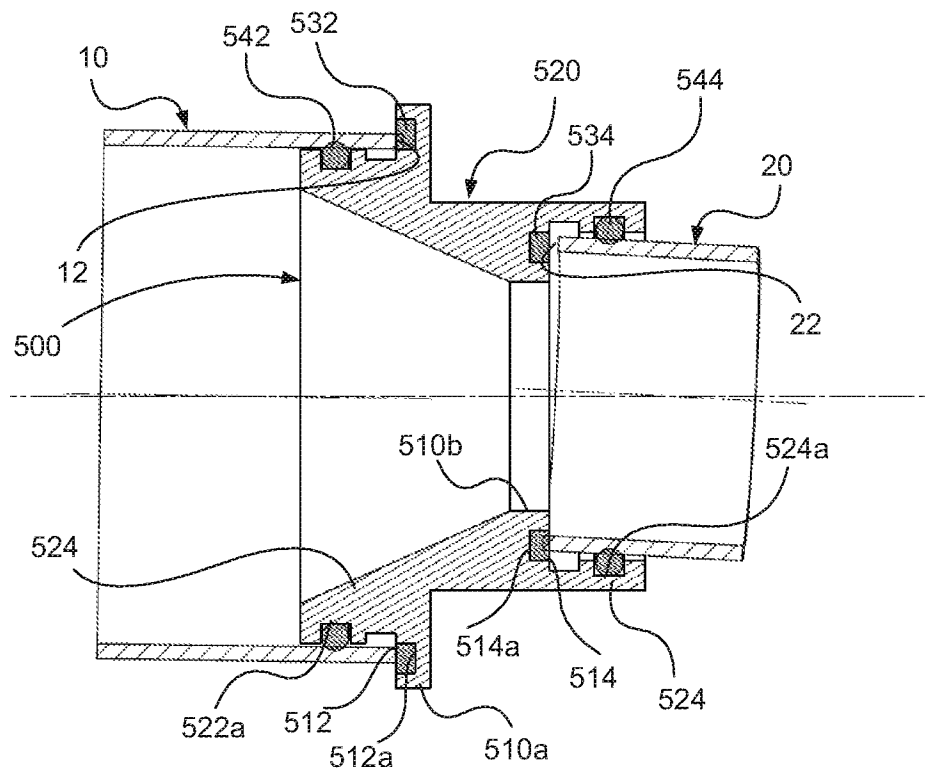


Fig. 5

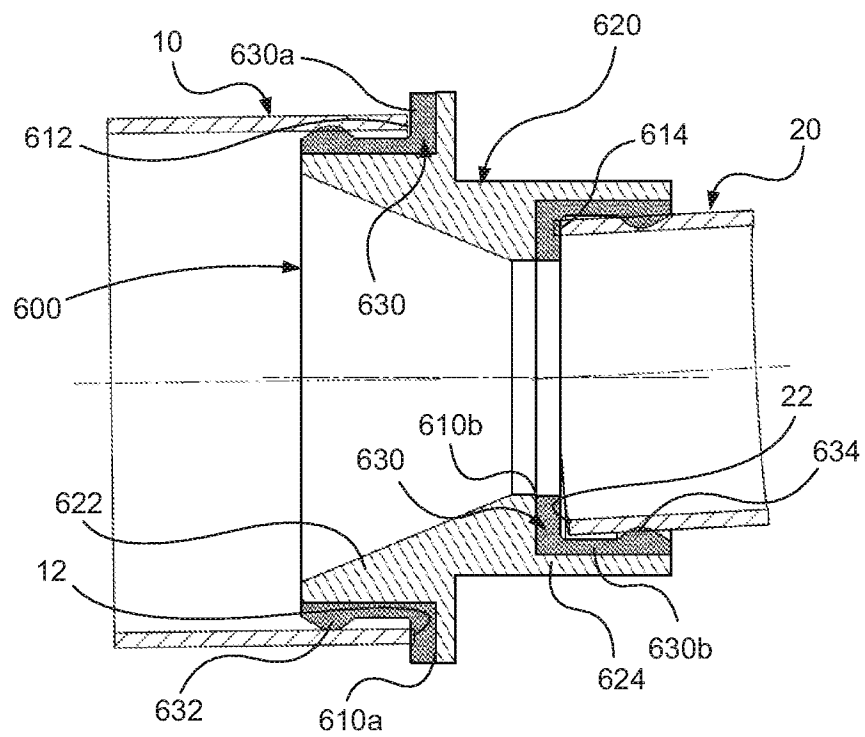


Fig. 6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2014/050324

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: F16L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE, DK, FI, NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, PAJ, WPI data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FR 1534902 A (SEMT), 2 August 1968 (1968-08-02); figures 1,2	1-5, 7, 8, 10, 11, 12
Y	--	6, 9
Y	US 20060157972 A1 (CATTON DOUGLAS), 20 July 2006 (2006-07-20); figures 3-6	6
Y	DE 3203054 A1 (MENGERING SANITAER HAUSTECH), 9 September 1982 (1982-09-09); page 6, line 4 - line 6; figure 1; pos 10, 11	9



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

“A” document defining the general state of the art which is not considered to be of particular relevance

“E” earlier application or patent but published on or after the international filing date

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“O” document referring to an oral disclosure, use, exhibition or other means

“P” document published prior to the international filing date but later than the priority date claimed

“T” later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

“X” document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

“Y” document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

“&” document member of the same patent family

Date of the actual completion of the international search

03-07-2014

Date of mailing of the international search report

04-07-2014

Name and mailing address of the ISA/SE

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2014/050324

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5106129 A1 (CAMACHO LUIS A ET AL), 21 April 1992 (1992-04-21); abstract; figures 1-4 -- -----	1-12

Continuation of: second sheet**International Patent Classification (IPC)*****F16L 21/02*** (2006.01)***F16L 27/113*** (2006.01)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/SE2014/050324

FR	1534902 A	02/08/1968	NONE
US	20060157972 A1	20/07/2006	NONE
DE	3203054 A1	09/09/1982	NONE
US	5106129 A1	21/04/1992	NONE