(19) Octrooicentrum Nederland

(11) **2013043**

(12) B1 **OCTROOI**

(21) Aanvraagnummer: **2013043**

(22) Aanvraag ingediend: **20/06/2014**

(51) Int. Cl.:
F16L 11/22 (2006.01) **F16L 39/02** (2006.01)

(43) Aanvraag gepubliceerd:
-

(47) Octrooi verleend:
06/07/2016

(45) Octrooischrift uitgegeven:
27/10/2016

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Halpa Intellectual Properties B.V.
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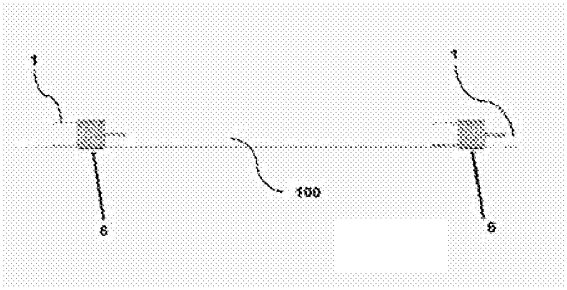
(54) **System of flexible pipes and coupling elements and method of producing such a flexible pipe.**

(57) The invention relates to a system of flexible pipes (1) and coupling elements (6) for coupling the flexible pipes. The flexible pipes each comprise an inner conduit and multiple cavities running substantially parallel over the outer surface of the inner conduit. The coupling elements each comprise an inner opening and multiple outer openings surrounding the inner opening, such that, in the coupled state, the inner conduits of adjacent flexible pipes are connected by means of the inner opening of the intermediate coupling element and the cavities of adjacent flexible pipes are connected by means of the outer openings of the intermediate coupling element. The invention further relates to a method of producing a flexible pipe as described as part of the system.



SYSTEM OF FLEXIBLE PIPES AND COUPLING ELEMENTS AND METHOD OF PRODUCING SUCH A FLEXIBLE PIPE

The invention relates to a system of flexible pipes and coupling elements for coupling the flexible pipes. The invention further relates to a method of producing a flexible pipe, preferably a pipe for use in the production of hydrocarbons.

By flexible pipe a pipe is meant that is sufficiently flexible to be rolled up for transportation. Flexibility also provides advantages during installation and operation. Moreover a flexible pipe can be easily retrieved in order to be re-used.

Flexible pipes for transporting fluid are known to be made from a combination of metal and thermoplastic sheaths and covers made using an extrusion process as described in WO2012/092931. This known pipe is suitable for use in the subsea transportation of fluids.

The present invention has for its object to provide a system according to the preamble of universal, flexible pipes that are suitable for many purposes.

According to the present invention this object is achieved by a system according to the preamble, wherein the flexible pipes each comprise an inner conduit and multiple cavities running substantially parallel over the outer surface of the inner conduit and wherein the coupling elements each comprise an inner opening and multiple outer openings surrounding the inner opening, such that, in the coupled state, the inner conduits of adjacent flexible pipes are connected by means of the inner opening of the intermediate coupling element and the cavities of adjacent flexible pipes are connected by means of the outer openings of the intermediate coupling element.

A further object of the present invention is to provide a method of producing such a flexible pipe having multiple fluid passageways.

According to the present invention this further object is achieved by a method of producing a flexible pipe, comprising the following steps:

a) Selecting a tube for forming an inner conduit;
b) Placing a number of spacer elements at a mutual distance on to the inner conduit, said spacer elements having a general longitudinal shape; and
c) Fixating the spacer elements to the inner conduit;
d) Applying one or more layers comprising thermoplastic material to the spacer elements to form an outer cover, such that cavities are

enclosed between the inner conduit, the spacer elements and the outer cover; and

e) Fixating at least one of the layers to the spacer elements, such that the cavities are suitable for use as passageways for objects.

The invention provides a universal system of interconnectable flexible pipes that is suitable for many purposes. The system according to the invention is specifically for transporting flowing material, such as a fluid or particles, preferably for use in the production of hydrocarbons.

The cavities surrounding the inner conduit allow the pipe to be adapted for cooperation with all types of equipment. Objects, such as cables, can be received in the cavities, for instance data cables, power cables, optic fibre cables, for connecting equipment. One example is the equipment described in the international patent application WO2014/011043 of the same applicant. Herein a so called Wire line Retrievable Oil Production (WROP) system is described for the production of hydrocarbons. Specifically the pipe according to the present invention can be used as a tubing to receive plug-in devices as described in WO2014/011043.

According to a first preferred embodiment each coupling element comprises a male part and a female part for receiving the male part and a joint element for placement between two flexible pipes, wherein the joint element comprises the inner opening and the outer openings and further comprises through holes for longitudinal fasteners, wherein the flexible pipes at the outer ends are arranged for receiving the fasteners. The coupling element provides for a fluid tight seal. Furthermore the coupling element can be coupled and decoupled manually without the need for additional tools.

According to a further preferred embodiment each flexible pipe comprises:

- An inner conduit;
- A number of spacer elements having a general longitudinal shape fixated at a mutual distance to the outer side of the inner conduit;
- An outer cover formed by one or more layers of thermoplastic material fixated around the inner conduit and the spacer elements, such that longitudinal cavities suitable for use as passageways for objects are formed between the inner conduit, the spacer elements and the outer cover.

In this preferred embodiment of the system the flexible pipes can be produced in a fast and reliable manner and can be adapted optimally for their

intended use. Depending on the specific use of the pipe the spacer elements can be laid in different patterns, including extending substantially in longitudinal or helical direction over the inner conduit.

The inner conduit can be reinforced in a preferred embodiment, wherein the inner conduit comprises an inner cover formed by one or more layers of thermoplastic material fixated around the inner conduit.

According to a multipurpose embodiment of the pipe according to the invention inlet/outlet openings are arranged in the wall of the pipe for allowing material flowing in/out of the cavities.

It is noted that in EP1039201 a flexible pipe having cavities surrounding the inner conduit is described. This known pipe is described to be made from thermoplastic materials using an extrusion process. The known pipe is not suitable for transporting fluids, since it cannot withstand the corresponding (high) pressures. The known pipe is developed but for use in housing and laying of cables only.

The invention will now further be described referring to the appending figures, in which:

Figure 1 schematically illustrates production of a first embodiment of a pipe according to the invention;

Figure 2A schematically shows part of the pipe of figure 1 in cross section;

Figure 2B schematically shows the pipe of figure 2A with partly cut away section; and

Figure 3A schematically shows a second embodiment of a pipe according to the invention with cut away sections;

Figure 3B schematically shows the second embodiment of figure 3A in cross section with cut away sections;

Figure 4A schematically shows a system of pipes coupled by coupling elements according to the invention;

Figure 4B schematically shows the system of figure 4A in decoupled state; and

Figure 4C schematically shows part of the coupling element of figure 4B in more detail;

Figure 4D shows part the part of figure 4C in cross section;

Figure 5A schematically shows a pair of pipes according to the invention that are coaxially arranged and accommodate equipment;

Figure 5B shows the pair of coaxially arranged pipes of figure 5A in cross section; and

Figure 5C shows one pipe of the pair of coaxially arranged pipes of figure 5A partly in cross section with equipment.

Figure 1 schematically illustrates pipe 1 in a first embodiment during production according to the method according to the invention. Figure 2A schematically shows a cross section of part of pipe 1. Figure 2B schematically shows the pipe 1 of figure 2A with partly cut away section.

Pipe 1 is a first embodiment suitable for use in the production of hydrocarbons. All materials used therein need to be able to withstand the high pressure and high temperature that may occur during the production of hydrocarbons. Preferably use is made of thermoplastic materials. One example of a specifically suitable thermoplastic material is known in the relevant field as (PEEK) polymer, a polyaryletherketone material produced by VICTREX.

In a first step of the method according to the invention a tubular body 2 is selected for forming an inner conduit of the pipe 1. Tube 2 is preferably produced using known extrusion methods.

Depending on the intended use of the pipe and the characteristics of the tube 2 the first step optionally further comprises applying an inner cover 3 over the inner conduit 2. Preferably one or more layers 31, 32, 33 are wound around the inner conduit 2 to form the inner cover 3.

The layers 31-33 may include thermoplastic material, reinforcing material and/or protective material. Suitable reinforcing material comprises aramid fibres. Suitable protective material provides protection against abrasion.

According to a second step of the method according to the invention a number of spacer elements 10 are attached at a mutual distance to the outer side of the inner conduit 2. Each spacer element 10 has a general longitudinal shape. The spacer elements 10 can be laid in suitable patterns. One preferred pattern involves attaching the spacer elements 10 such that they extend substantially in longitudinal direction over the inner conduit 2. This preferred embodiment is shown in figure 1. In the preferred embodiment shown the longitudinal direction of the pipe 1 is denoted with the arrow and letter L. The mutual distance between adjacent spacer elements 10 is denoted with the arrow and letter C. As the pattern of spacer elements 10 extends in longitudinal direction L, the mutual distance C between the spacer

elements 10 is a circumferential distance.

Figures 3A and 3B schematically show a pipe 1' according to the invention with partly cut away section. Pipe 1' is an alternative second embodiment, wherein the spacer elements 10 are attached such that they extend substantially in helical direction around the inner conduit 2.

The spacer elements are preferably of a non-corrosive metal or a thermoplastic material. The spacer elements are preferably arranged substantially equidistant. The spacer elements may be cut out of a further tube. Said further tube is selected such that its inner radius substantially corresponds to the outer radius of the tube for forming the inner conduit 2. The further tube or the individual spacer elements can also be produced by known methods of extrusion.

The spacer elements can either be massive or hollow. Hollow spacer elements 11 include cavities or channels allowing flow of material through the spacer elements.

The spacer elements 10 are first placed in the desired pattern and then adhered to the inner conduit 2. Suitable adhesive materials may be used. Alternatively when thermoplastics are used the pipe may be heated at least in part up to the softening temperature of the thermoplastic materials during a predetermined time period for adhering the spacer elements 10 to the inner conduit 2. Suitable heating means may include a laser to temporary heat the contacting surfaces of the spacer elements 10 with the inner conduit 2.

According to a further step of the method according to the invention an outer cover 4 is applied around the inner conduit 2 and the spacer elements 10. As a result thereof cavities or channels 5 are enclosed by the inner conduit 2, the spacer elements 10 and the outer cover 4. Preferably one or more layers 41, 42, 43 are wound around the inner conduit 2 and the spacer elements 10 to form outer cover 4.

The layers 41-43 may include thermoplastic material, reinforcing material and/or protective material. Suitable reinforcing material comprises aramid fibres. Suitable protective material provides protection against abrasion.

A final step of the method according to the invention comprises adhering the spacer elements 10 to the outer cover 4 as well as adhering the layers to form the outer cover. Suitable adhesive materials may be used. When thermoplastics are used adhering may be accomplished by heating the pipe at least in part up to the softening temperature of the thermoplastic materials during a predetermined time period. Suitable heating means may include a laser to temporary heat the contacting

surfaces of the spacer elements 10 with the outer cover 4 and the layers therein.

Preferably the cavities or channels 5 are fluid tight and suitable for use as fluid passageways in the production of hydrocarbons.

Inlet/outlet openings can be arranged in the wall of the pipe to allow fluid to flow between the inner conduit 2 and the cavities 5 and/or between the cavities 5 and the surroundings of the pipe 1. This is illustrated in figures 5A, 5B and 5C.

Figure 4A schematically shows a system of pipes 1 coupled by coupling elements 6 according to the invention. The coupling elements 6 are arranged to provide for continuous passageways through the coupled pipes. In the coupled state the inner conduits 2 of adjacent pipes form a continuous inner channel. In the coupled state the cavities 5 or 15 of adjacent pipes form continuous outer channels. In figure 4A a longitudinal housing 100 is coupled at both outer ends to a flexible pipe 1 according to the invention. The housing is an example of a tubing arranged to receive plug-in devices of the WROP-system as described in WO2014/011043.

Figure 4B schematically shows the system of figure 4A in decoupled state. Coupling element 6 is shown in more detail in figure 4C. Coupling element 6 comprises a male part 63 and a female part 64 for receiving the male part 63 and a joint element 61 for placement between the flexible pipes 1 or 100. The joint element 1comprises an inner opening 62 and surrounding outer openings 65 and further comprises through holes 66 for longitudinal fasteners 67, such as bolts. In the coupled state of the coupling element 6 the joint element 61 is enclosed therein.

The dimensions of the inner opening 62 of the coupling element 6 correspond to the dimensions of the inner conduit 2 of pipe 1. The dimensions of the outer openings 65 of the coupling element 6 correspond to the dimensions of the cavities 5 or 15 of pipe 1. In figures 4C and 4D the dashed arrows indicate passageways for materials and the dashed lines indicate the through holes for the fasteners. The joint element 61 is generally ring shaped. The outer openings 65 and the holes 66 are arranged alternately over the joint element 61. The holes 66 are recessed with respect to the outer openings 65. The shape of the outer openings 65 corresponds to the shape of the cavities 5 of the pipe 1. The mating shape of the joint element 61 and the outer ends of the flexible pipes 1 allow for a fluid tight seal.

At the outer ends of the flexible pipes 1 slots 69 are arranged for receiving the fasteners 67. In the preferred embodiment shown two pairs of three bolts each face each other. Preferably the female part 64 has inner thread and the male part 63 has outer thread. Coupling element 6 can be coupled and decoupled manually.

The coupling element according to the invention can further be connected to the following non-limited enumeration of examples:

a) Pipe Equipment Elements used in Hydrocarbon production environments, such as Sliding Side doors, to interconnect (open or closing) the inner pipe to the external environments
b) Crossovers – to connect the pipe to smaller or larger diameter pipes or elements;
c) Packer elements to seal-off the external or inner spaces in and around the pipe,
d) Filter elements (wired or slotted) for in and out-flowing fluids or gasses,
e) Side Pocket elements for use with measuring equipment and valves
f) Anchor elements to fixate the pipes into a larger diameter pipe or external conduit.

Figures 5A through 5C illustrate a pair of pipes 1A, 1B according to the invention that are coaxially arranged and accommodate equipment 200. One example of equipment is a plug-in device of the WROP-system as described in WO2014/011043.

Fluid flow in the cavities 5A of outer pipe 1A is indicated with arrow F1. A substantially parallel fluid flow in the cavities 5B of inner pipe 1B is indicated with arrow F2. A substantially parallel fluid flow through the equipment 200 is indicated with arrow F3. Inlet/outlet openings 51 are arranged in adjacent walls of the pipes 1A, 1B to allow fluid flow R1 between the cavities 5A and 5B. Inlet/outlet openings 52 are arranged in the wall of the pipe 1B to allow fluid flow R2 between the cavities 5B and openings in the equipment 200. The inlet/outlet openings are sealed, as illustrated by seals 53 adjacent to inlet/outlet openings 51. Suitable fixation means 210 are present to fixate the equipment 200 in the pipe 1B.

The present invention is elucidated by means of preferred embodiments for use in the production of hydrocarbons. Nevertheless it is stretched that the pipe is generally suitable for transporting material flows, including fluid, gases, or particles, and is generally suitable for transporting all types of material flows even in highly demanding circumstances.

The invention is not therefore limited to the described and shown preferred embodiments, but extends to all combinations thereof and moreover to any embodiment falling within the scope of protection as defined in the claims and as seen in the light of the foregoing description and accompanying drawings.

CONCLUSIES

1. Systeem van flexibele pijpen en koppelelementen voor het koppelen van de flexibele pijpen, waarin de flexibele pijpen elk een binnenleiding en meerdere holtes omvatten, die in hoofdzaak parallel verlopen over het buitenoppervlak van de binnenleiding, en waarin de koppelelementen elk een binnenste opening en meerdere buitenste openingen omvatten, die de binnenste opening omgeven, zodanig dat, in gekoppelde toestand, de binnenleidingen van aangrenzende flexibele pijpen zijn verbonden door middel van de binnenste opening van het tussengelegen koppelelement en de holtes van aangrenzende flexibele pijpen zijn verbonden door middel van de buitenste openingen van het tussengelegen koppelelement.
2. Systeem volgens conclusie 1, waarin elk koppelelement een mannelijk deel en een vrouwelijk deel omvat voor het ontvangen van het mannelijke deel en een verbindingselement voor plaatsing tussen twee flexibele pijpen, waarin het verbindingselement de binnenste opening en de buitenste openingen omvat en verder doorgaande gaten omvat voor longitudinale bevestigingsmiddelen, waarin de flexibele pijpen aan de buitenste einden ervan zijn ingericht voor het ontvangen van de bevestigingsmiddelen.
3. Systeem volgens conclusie 1 of 2, waarin elke flexibele pijp omvat:
   a) een binnenleiding;
   b) een aantal afstandselementen met een algemeen longitudinale vorm, die zijn gefixeerd op een onderlinge afstand aan de buitenzijde van de binnenleiding; en
   c) een buitenbekleding, die is gevormd door één of meer lagen thermoplastisch materiaal, dat is gefixeerd rond de binnenleiding en de afstandselementen, zodanig dat longitudinale holtes zijn gevormd, die geschikt zijn voor gebruik als doorgang voor objecten, tussen de binnenleiding, de afstandselementen en de buitenbekleding.
4. Systeem volgens conclusie 3, waarin de binnenleiding een binnenbekleding omvat, die is gevormd door één of meer lagen thermoplastisch materiaal, die zijn gefixeerd rond de binnenleiding.
5. Systeem volgens conclusies 3 of 4, waarin de afstandselementen zijn gefixeerd, zodanig dat deze zich in hoofdzaak in longitudinale of spiraalvormige richting over de binnenleiding uitstrekken.

6. Systeem volgens één of meer van de voorgaande conclusies 3/5, waarin inlaatopeningen, respectievelijk uitlaatopeningen zijn aangebracht in de wand van de pijp om materiaal in, respectievelijk uit de holtes te laten stromen.
7. Koppelelement zoals beschreven als onderdeel van het systeem volgens één of meer van de voorgaande conclusies.
8. Werkwijze voor het produceren van een flexibele pijp, zoals beschreven als onderdeel van het systeem volgens één of meer van de voorgaande conclusies 1 tot en met 7, omvattende de volgende stappen:
   a) het selecteren van een buis voor het vormen van een binnenleiding;
   b) het plaatsen van een aantal afstandselementen op een onderlinge afstand tegen de binnenleiding, waarbij de genoemde afstandselementen een algemeen longitudinale vorm hebben;
   c) het fixeren van de afstandselementen aan de binnenleiding;
   d) het aanbrengen van één of meer lagen omvattende thermoplastisch materiaal op de afstandselementen om een buitenbekleding te vormen, zodanig dat holtes worden ingesloten tussen de binnenleiding, de afstandselementen en de buitenbekleding; en
   e) het fixeren van ten minste één van de lagen aan de afstandselementen, zodanig dat de holtes geschikt zijn voor gebruik als doorgang voor objecten.
9. Werkwijze volgens conclusie 8, waarbij stap d) omvat het wikkelen van één of meer lagen omvattende thermoplastisch materiaal rond de binnenleiding met de afstandselementen om de buitenbekleding te vormen.
10. Werkwijze volgens conclusie 8 of 9, waarbij stap a) verder omvat het wikkelen van één of meer lagen omvattende thermoplastisch materiaal rond de binnenleiding om een binnenbekleding te vormen en waarbij de werkwijze verder omvat stap f) het fixeren van ten minste één van de lagen aan de binnenleiding.
11. Werkwijze volgens één of meer van de voorgaande conclusies 8 - 10, waarbij ten minste één van de afstandselementen één of meer verdere holtes omvat.
12. Werkwijze volgens één of meer van de voorgaande conclusies 8 - 11, waarbij de afstandselementen zodanig worden geplaatst dat deze zich in hoofdzaak in longitudinale of spiraalvormige richting over de binnenleiding uitstrekken.

13. Werkwijze volgens één of meer van de voorgaande conclusies 8 – 12, waarbij stap a) en/of stap d) de stap omvatten van het wikkelen van een eerste laag bekledingsmateriaal en een tweede laag versterkingsmateriaal rond de eerste laag.
14. Werkwijze volgens conclusie 13, waarbij stap a) en/of stap d) verder omvat de stap van het wikkelen van een derde laag beschermingsmateriaal rond de tweede laag.
15. Werkwijze volgens één of meer van de voorgaande conclusies 8 – 14, waarbij het fixeren wordt bereikt door middel van verlijmen of warmteoverdracht, bij voorkeur warmteoverdracht door lasermiddelen.

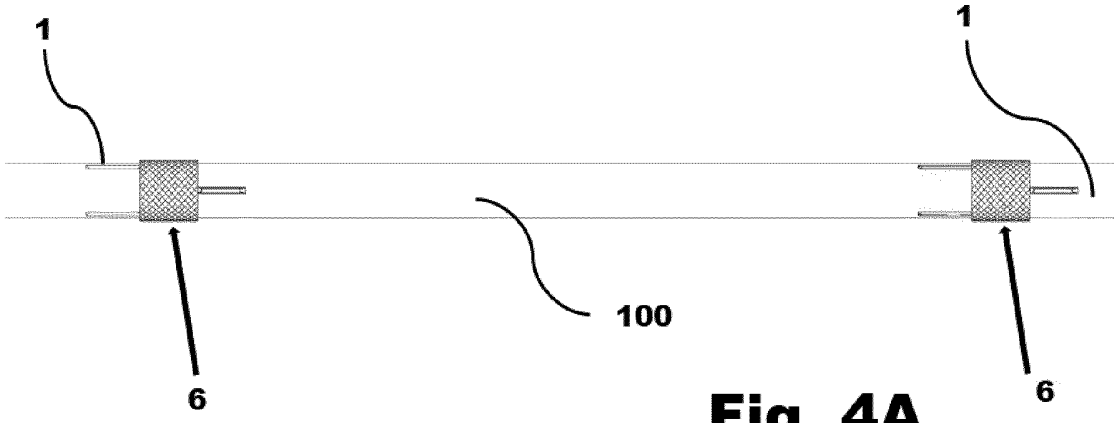


Fig. 4A

ABSTRACT

The invention relates to a system of flexible pipes (1) and coupling elements (6) for coupling the flexible pipes. The flexible pipes each comprise an inner conduit and multiple cavities running substantially parallel over the outer surface of the inner conduit. The coupling elements each comprise an inner opening and multiple outer openings surrounding the inner opening, such that, in the coupled state, the inner conduits of adjacent flexible pipes are connected by means of the inner opening of the intermediate coupling element and the cavities of adjacent flexible pipes are connected by means of the outer openings of the intermediate coupling element.

The invention further relates to a method of producing a flexible pipe as described as part of the system.

Figure 4A

Agentschap NL
Ministerie van Economische Zaken

OCTROOIAANVRAAG NR.:
NO 139087
NL 2013043

ONDERZOEKSRAPPORT

BETREFFENDE HET RESULTAAT VAN HET ONDERZOEK NAAR DE STAND VAN DE TECHNIEK

RELEVANTE LITERATUUR

Categorie[1]	Literatuur met, voor zover nodig, aanduiding van speciaal van belang zijnde tekstgedeelten of figuren.	Van belang voor conclusie(s) nr:	Classificatie (IPC)
X Y	US 2008/006337 A1 (QUIGLEY PETER A [US] ET AL) 10 januari 2008 (2008-01-10) * alinea [0029] - alinea [0059] * * figuren 1,2,4 * -----	1,3-15 2	INV. F16L11/22 F16L39/02
X Y A	EP 1 731 823 A1 (SINGLE BUOY MOORINGS [CH]) 13 december 2006 (2006-12-13) * kolom 4, regel 18 - kolom 6, regel 57 * * figuren 2a,2b,35a,5b,9 * -----	7 2 1,8	
X Y A	US 5 713 607 A (WEBB MICHAEL C [US]) 3 februari 1998 (1998-02-03) * kolom 3, regel 30 - kolom 4, regel 3 * * kolom 11, regel 21 - kolom 15, regel 35 * * figuren 5-7 * -----	1,7,8 2 3-6,9-14	
X A	US 5 423 353 A (SORENSEN JEFF [CA]) 13 juni 1995 (1995-06-13) * kolom 2, regel 22 - kolom 3, regel 32 * * figuren 1,4-7 * -----	1,7 5,6,8,12	
A	US 4 341 392 A (VAN DONGEREN JAN P) 27 juli 1982 (1982-07-27) * samenvatting * -----	15	Onderzochte gebieden van de techniek F16L

Indien gewijzigde conclusies zijn ingediend, heeft dit rapport betrekking op de conclusies ingediend op:

Plaats van onderzoek:	Datum waarop het onderzoek werd voltooid:	Bevoegd ambtenaar:
München	27 november 2014	Vecchio, Giovanni

[1] CATEGORIE VAN DE VERMELDE LITERATUUR

X: de conclusie wordt als niet nieuw of niet inventief beschouwd ten opzichte van deze literatuur
Y: de conclusie wordt als niet inventief beschouwd ten opzichte van de combinatie van deze literatuur met andere geciteerde literatuur van dezelfde categorie, waarbij de combinatie voor de vakman voor de hand liggend wordt geacht
A: niet tot de categorie X of Y behorende literatuur die de stand van de techniek beschrijft
O: niet-schriftelijke stand van de techniek
P: tussen de voorrangsdatum en de indieningsdatum gepubliceerde literatuur
T: na de indieningsdatum of de voorrangsdatum gepubliceerde literatuur die niet bezwarend is voor de octrooiaanvrage, maar wordt vermeld ter verheldering van de theorie of het principe dat ten grondslag ligt aan de uitvinding
E: eerdere octrooi(aanvrage), gepubliceerd op of na de indieningsdatum, waarin dezelfde uitvinding wordt beschreven
D: in de octrooiaanvrage vermeld
L: om andere redenen vermelde literatuur
&: lid van dezelfde octrooifamilie of overeenkomstige octrooipublicatie

EOB FORM 02.83 (P0414B)

AANHANGSEL BEHORENDE BIJ HET RAPPORT BETREFFENDE HET ONDERZOEK NAAR DE STAND VAN DE TECHNIEK, UITGEVOERD IN DE OCTROOIAANVRAGE NR.

NO 139087
NL 2013043

Het aanhangsel bevat een opgave van elders gepubliceerde octrooiaanvragen of octrooien (zogenaamde leden van dezelfde octrooifamilie), die overeenkomen met octrooischriften genoemd in het rapport.
De opgave is samengesteld aan de hand van gegevens uit het computerbestand van het Europees Octrooibureau per
De juistheid en volledigheid van deze opgave wordt noch door het Europees Octrooibureau, noch door het Bureau voor de Industriële eigendom gegarandeerd; de gegevens worden verstrekt voor informatiedoeleinden.

27-11-2014

In het rapport genoemd octrooigeschrift	Datum van publicatie	Overeenkomend(e) geschrift(en)	Datum van publicatie
US 2008006337 A1	10-01-2008	GEEN	
EP 1731823 A1	13-12-2006	AR 053622 A1	09-05-2007
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EPO FORM P0466

Algemene informatie over dit aanhangsel is gepubliceerd in de 'Official Journal' van het Europees Octrooibureau nr 12/82 blz 448 ev

SCHRIFTELIJKE OPINIE

DOSSIER NUMMER	INDIENINGSDATUM	VOORRANGSDATUM	AANVRAAGNUMMER
NO139087	20.06.2014		NL2013043

CLASSIFICATIE
INV. F16L11/22 F16L39/02

AANVRAGER
Halpa Intellectual Properties B.V.

Deze schriftelijke opinie bevat een toelichting op de volgende onderdelen:

- ☒ Onderdeel I Basis van de schriftelijke opinie
- ☐ Onderdeel II Voorrang
- ☐ Onderdeel III Vaststelling nieuwheid, inventiviteit en industriële toepasbaarheid niet mogelijk
- ☐ Onderdeel IV De aanvraag heeft betrekking op meer dan één uitvinding
- ☒ Onderdeel V Gemotiveerde verklaring ten aanzien van nieuwheid, inventiviteit en industriële toepasbaarheid
- ☐ Onderdeel VI Andere geciteerde documenten
- ☒ Onderdeel VII Overige gebreken
- ☒ Onderdeel VIII Overige opmerkingen

	DE BEVOEGDE AMBTENAAR

Aanvraag nr.:

SCHRIFTELIJKE OPINIE

NL2013043

Onderdeel I Basis van de Schriftelijke Opinie

1. Deze schriftelijke opinie is opgesteld op basis van de meest recente conclusies ingediend voor aanvang van het onderzoek.

2. Met betrekking tot **nucleotide en/of aminozuur sequenties** die genoemd worden in de aanvraag en relevant zijn voor de uitvinding zoals beschreven in de conclusies, is dit onderzoek gedaan op basis van:

   a. type materiaal:

   ☐ sequentie opsomming

   ☐ tabel met betrekking tot de sequentie lijst

   b. vorm van het materiaal:

   ☐ op papier

   ☐ in elektronische vorm

   c. moment van indiening/aanlevering:

   ☐ opgenomen in de aanvraag zoals ingediend

   ☐ samen met de aanvraag elektronisch ingediend

   ☐ later aangeleverd voor het onderzoek

3. ☐ In geval er meer dan één versie of kopie van een sequentie opsomming of tabel met betrekking op een sequentie is ingediend of aangeleverd, zijn de benodigde verklaringen ingediend dat de informatie in de latere of additionele kopieën identiek is aan de aanvraag zoals ingediend of niet meer informatie bevatten dan de aanvraag zoals oorspronkelijk werd ingediend.

4. Overige opmerkingen:

Aanvraag nr.:

SCHRIFTELIJKE OPINIE

NL2013043

Onderdeel V Gemotiveerde verklaring ten aanzien van nieuwheid, inventiviteit en industriële toepasbaarheid

1. Verklaring

Nieuwheid	Ja:	Conclusies 2
	Nee:	Conclusies 1, 3-15
Inventiviteit	Ja:	Conclusies
	Nee:	Conclusies 1-15
Industriële toepasbaarheid	Ja:	Conclusies 1-15
	Nee:	Conclusies

2. Citaties en toelichting:

Zie aparte bladzijde

Onderdeel VII Overige gebreken

De volgende gebreken in de vorm of inhoud van de aanvraag zijn opgemerkt:

Zie aparte bladzijde

Onderdeel VIII Overige opmerkingen

De volgende opmerkingen met betrekking tot de duidelijkheid van de conclusies, beschrijving, en figuren, of met betrekking tot de vraag of de conclusies nawerkbaar zijn, worden gemaakt:

Zie aparte bladzijde

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1 Document US-A-2008/0006337 discloses (see mainly figure 4 and description thereof) a system (see e.g. paragraph [00259] in combination with paragraphs [0052] and [0053]) of flexible pipes 10 and coupling elements (paragraphs [0052] and [0053]), the flexible pipes comprising an inner conduit 12 and multiple cavities 20, 22 running substantially parallel over the outer surface of the inner conduit, the coupling elements comprising an inner opening and multiple outer openings (paragraphs [0052] and [0053]), as it is defined in claim 1.

Hence, the subject-matter of independent claim 1 does not meet the requirements of novelty.

2 The same objection of lack of novelty with respect to the subject-matter of independent claim 1 can be raised also in view of document US-A-5 713 607 (see flexible pipes with cavities Si and corresponding coupling elements F, N, 100 with outer openings 62, 110 and inner opening) or US-A-5 423 353 (cf. flexible pipes 9 and corresponding couplings 20, 22 with inner and outer openings 26, 48, 28, 50).

3 Moreover, independent claim 7 merely defines a general coupling (see also objection under point VIII): each one of the above-cited documents (as well as EP-A-1 731 823: see, e.g. figure 3 or 5a) discloses such a coupling.

Hence, the subject-matter of independent claim 7 is not new.

4 Furthermore, the above-mentioned document US-A-2008/0006337 anticipates as well the subject-matter of independent method claim 8 (see also objection under point VIII): see selecting the inner conduit 12, placing and fixing the spacer elements 20 on the inner conduit e.g. as described in paragraph [0041], applying one or more layers comprising thermoplastic material and fixing to the spacer elements 20 e.g. as described in paragraphs [0041] and [0048].

Therefore, the subject-matter of independent claim 8 does not meet the criteria of novelty.

5 Moreover, said US-A-2008/0006337 directly discloses also the subject-matter of dependent claims 3-6 and 9-15: for example, see the layers in paragraphs [0033]-[0035] and [0048] as defined in claims 3, 4, 9, 10, 13 and 14, or the

longitudinal or helical direction of the spacer elements in paragraph [0043] as in claims 5 and 12, or the inlet-outlet openings in e.g. paragraph [0052] (see "venting") as in claim 6, or the spacer elements with further cavities and fixed by bonding or heat treatment in paragraphs [0053] and [0041] as in claims 11 and 15.

Thus, the subject-mattar of claims 3-6 and 9-15 is not new.

6 Furthermore, the additional features defined by claim 2 are already known in the art: see for instance the male and female parts with the joint in the US-A-5 713 607 (reference signs N, 100 and F) or the through holes with fasteners 45 for connection to the pipes in figure 5b of EP-A-1 731 823. Such features will be selected by a skilled person in accordance with circumstances because the advantages thereby achieved can be readily contemplated in advance. The combination of such features with any claim to which they refer does not involve an inventive step.

7 The industrial applicability of the claimed subject-matter is clearly given in the description.

Re Item VII

Certain defects in the application

8 The claims are not provided with reference signs, nor are cast in the two part-form.

Re Item VIII

Certain observations on the application

9 The subject-matter of independent claims 7 and 8 is not clear since it refers to only a part of another claim: see "zoals beschreven als onderdeel van het systeem volgens één of meer de voorgaande conclusies".