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(54) Title: MOTOR VEHICLE TANK MADE OF CROSSLINKED POLYMER

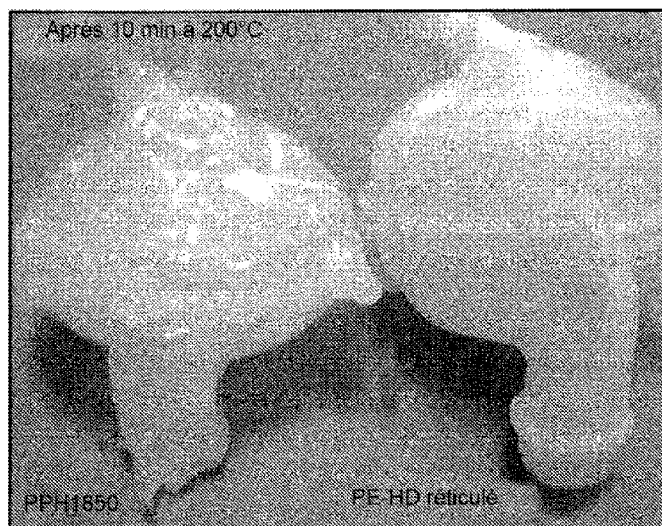


Fig.1

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LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK,
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(57) Abstract: The invention relates to the use of a crosslinked polymer for the preparation, from at least two elements, of an assembly forming a container for a motor vehicle, in particular for forming a degassing tank or an expansion vessel. The invention also provides a process for preparing an assembly forming a container for a motor vehicle from a crosslinked polymer, and also this assembly.

MOTOR VEHICLE TANK MADE OF CROSSLINKED POLYMERDESCRIPTION

The invention relates to the use of a crosslinked polymer for the preparation,
5 from at least two elements, of an assembly forming a container for a motor
vehicle, in particular for forming a degassing tank or an expansion vessel.

The invention also provides a process for preparing an assembly forming a
motor vehicle container from a crosslinked polymer, and also this assembly.

10 Containers for motor vehicles are subject to numerous constraints, in particular
the containers placed in the engine compartment.

The constraints endured are mechanical, especially associated with the fixing or
holding of these containers, or associated with the internal pressure, but also
thermal constraints, especially due to the high temperatures generated during
15 the running of the engine or due to the temperature of the fluids contained.

Containers for motor vehicles must also be able to withstand the constraints
associated with the environment in which the motor vehicle is used, in particular
climatic, mechanical or chemical constraints, especially in terms of chemical
resistance to the substances contained, but also to other substances that may
20 be present in their environment.

These constraints require the use of manufacturing materials that are
sufficiently resistant. Containers for motor vehicles are therefore usually made
of polymeric material.

25 The mass of these containers should be limited, whereas their resistance,
especially their mechanical strength or heat resistance, should be increased.

Moreover, containers for motor vehicles must be resistant or inert with respect
30 to chemical attack. Specifically, these containers must be able to receive fluids
without their properties, especially their leaktightness, their capacity or their

shape, being modified or impaired. They should not be damaged by the fluids they contain, either as regards gaseous fluids or liquid fluids.

They should not be damaged by the other fluids present in their environment, in particular by the other fluids used in a motor vehicle, especially in the engine
5 compartment.

The resistance properties of containers for motor vehicles should be particularly high when the constraints to which they are subjected are combined.

These properties must be maintained over time.

10

The use of crosslinked materials for manufacturing objects is known. JP S58 59014 discloses pipes for transporting hot water. These pipes are made of crosslinked polyolefin and the crosslinking is obtained by contact with water. WO 01/83613 describes the manufacture of tubes made of crosslinked
15 materials which comprise silane groups but no catalyst.

US 2009/075004 describes the manufacture by extrusion and thermoforming of single-walled or double-walled tubes. The material used is high-density polyethylene (HDPE). The crosslinking is obtained in the presence of moisture. None of these documents concerns the manufacture of containers for motor
20 vehicles.

The known containers for motor vehicles do not make it possible to provide satisfactory solutions to the problems encountered, in particular from a technical point of view and within acceptable costs.

25

The use and the process according to the invention provide a solution to all or some of the problems of the prior art containers for motor vehicles.

Moreover, during their manufacture, the containers for motor vehicles prepared
30 from several elements must be assembled. These elements must be fixed together, in particular by welding or bonding.

When these elements are prepared from a crosslinkable material and when crosslinking takes place, the elements can no longer be assembled by bonding or welding.

The process according to the invention constitutes a solution to this problem.

5

There is thus a need to improve the properties of containers for motor vehicles and also the processes for preparing them.

The invention relates to the use of a composition comprising at least one
10 grafted or ungrafted crosslinkable polymer, chosen from filled or non-filled polyolefins, filled or non-filled polyamides, and polyurethanes, for the preparation, from at least two elements, of an assembly chosen from containers for motor vehicles.

15 Preferably, the use according to the invention is implemented for the preparation of an assembly chosen from a degassing tank, an expansion vessel, a power-assisted-steering liquid tank, a brake liquid tank and a windshield-washer liquid tank.

Particularly preferably, the use according to the invention concerns the
20 preparation of an assembly chosen from a degassing tank, an expansion vessel and a power-assisted-steering liquid tank.

The use according to the invention allows the implementation of numerous crosslinkable polymers.

25 Advantageously, the use according to the invention implements a composition comprising at least one filled or non-filled crosslinkable polymer, chosen from polyethylene, low-density polyethylene, high-density polyethylene and polyamide 6-6.

Polyethylene is preferred, in particular high-density polyethylene.

30

For the use according to the invention, the composition comprises at least one polymer which may be chemically or physically crosslinked.

Advantageously, the composition used according to the invention may comprise

- at least one chemically crosslinkable polymer, which is ungrafted or grafted with silane groups, and
- a crosslinking catalyst.

5 Also advantageously, the composition used according to the invention may comprise

- at least one chemically crosslinkable polymer, which is ungrafted or grafted with silane groups, and
- at least one crosslinking agent chosen from peroxides.

10 Also advantageously, the composition used according to the invention may comprise

- at least one chemically crosslinkable polymer, which is ungrafted or grafted with silane groups,
- a crosslinking catalyst and
- at least one crosslinking agent chosen from peroxides.

Advantageously, the composition used according to the invention may also comprise at least one polymer which is physically crosslinkable by means of a radiation chosen from UV, IR and γ (gamma) radiation.

20 The invention also provides a process for preparing an assembly chosen from containers for motor vehicles, comprising at least two elements, successively comprising

- molding of the elements using a composition comprising at least one grafted or ungrafted crosslinkable polymer, chosen from filled or non-filled polyolefins, filled or non-filled polyamides, and polyurethanes;
- welding or bonding of the elements;
- crosslinking of the polymer.

The process according to the invention allows the preparation of numerous
30 containers for motor vehicles.

Preferably, the process according to the invention makes it possible to prepare a container for a motor vehicle chosen from a degassing tank, an expansion

vessel, a power-assisted-steering liquid tank, a brake liquid tank and a windshield-washer liquid tank.

Particularly preferably, the container for a motor vehicle is chosen from a degassing tank, an expansion vessel and a power-assisted-steering liquid tank.

5

For the process according to the invention, the filled or non-filled crosslinkable polymer is preferably chosen from polyethylene, low-density polyethylene, high-density polyethylene and polyamide 6-6.

Particularly advantageously, the filled or non-filled crosslinkable polymer is polyethylene, in particular low-density polyethylene or high-density polyethylene.

The polymer used is advantageously chosen from grafted crosslinkable polymers. An example of a grafted crosslinkable polymer that may be used is ethylene-vinylsilane (EVS).

15

The process according to the invention is particularly advantageous for the preparation of a degassing tank from a composition comprising high-density polyethylene, or of an expansion vessel from a composition comprising high-density polyethylene, or alternatively of a power-assisted-steering liquid tank from a composition comprising high-density polyethylene and polyamide 6-6, which are filled or non-filled.

The crosslinking of the polymer used for the process according to the invention is performed chemically or physically.

Advantageously, for the process according to the invention, the crosslinking is performed chemically and the composition comprises

- at least one chemically crosslinkable polymer, which is ungrafted or grafted with silane groups, and
- a crosslinking catalyst.

Also advantageously, the crosslinking is performed chemically and the composition comprises

30

- at least one chemically crosslinkable polymer, which is ungrafted or grafted with silane groups, and
- at least one crosslinking agent chosen from peroxides.

Also advantageously, the crosslinking is performed chemically and the
5 composition comprises

- at least one chemically crosslinkable polymer, which is ungrafted or grafted with silane groups,
- a crosslinking catalyst and
- at least one crosslinking agent chosen from peroxides.

10 Also advantageously, the crosslinking is performed physically and the composition comprises at least one polymer that is physically crosslinkable by means of a radiation chosen from UV, IR and γ (gamma) radiation.

The process according to the invention allows the preparation of an assembly
15 such as a container for a motor vehicle. The elements of the assembly according to the invention are prepared by molding from a composition based on at least one crosslinkable polymer.

For an equivalent polymer, the molding of the process according to the invention may be performed under the same pressure and temperature
20 conditions as for a non-crosslinkable polymer.

The process according to the invention allows the preparation of numerous assemblies chosen from containers for motor vehicles.

Thus, the invention relates to an assembly chosen from containers for motor
25 vehicles, comprising at least two elements and which is prepared or may be prepared according to the process of the invention.

Preferably, the assembly according to the invention is chosen from a degassing tank, an expansion vessel, a power-assisted-steering liquid tank, a brake liquid
30 tank and a windshield-washer liquid tank.

Particularly preferably, the assembly according to the invention is chosen from a degassing tank prepared from a composition comprising high-density

polyethylene, or an expansion vessel prepared from a composition comprising high-density polyethylene, or alternatively a power-assisted-steering liquid tank prepared from a composition comprising high-density polyethylene and polyamide 6-6, which may be filled or non-filled.

5

Figure 1 illustrates the aspect of a degassing tank according to the invention after heating compared with a reference tank after heating.

The examples that follow are given as illustrations of the various aspects of the invention.

10

A degassing tank according to the invention was manufactured from a first composition comprising grafted high-density polyethylene and from a second composition comprising high-density polyethylene and a catalyst.

A mixture of the first (98% by weight) and second (2% by weight) compositions was injected and then two half-sections of the degassing tank were molded.

15

The two half-sections of the tank were then hot-welded to form the tank.

The degassing tank according to the invention was then immersed in water at 80°C for 48 hours in order to accelerate the crosslinking of the grafted high-density polyethylene.

20

Moreover, a reference degassing tank was manufactured under the same conditions from a composition comprising non-crosslinked polypropylene that is approved for this application.

25

The two tanks were placed for 10 minutes in an oven heated at 200°C.

Under the effect of the temperature above their melting point, the reference tank collapses under its own weight, whereas the tank according to the invention undergoes little deformation.

30

Figure 1 illustrates the aspect of each of the tanks after heating.

This test clearly illustrates that the mechanical properties of the tank according to the invention are better than those of the reference tank.

CLAIMS

1. The use of a composition comprising at least one grafted or ungrafted crosslinkable polymer, chosen from filled or non-filled polyolefins, filled or non-filled polyamides, and polyurethanes, for the preparation, from at least two elements, of an assembly chosen from containers for motor vehicles.
2. The use as claimed in claim 1, for the preparation of an assembly chosen from a degassing tank, an expansion vessel, a power-assisted-steering liquid tank, a brake liquid tank and a windshield-washer liquid tank.
3. The use as claimed in claim 1 or 2, of a composition comprising at least one filled or non-filled crosslinkable polymer, chosen from polyethylene, low-density polyethylene, high-density polyethylene and polyamide 6-6.
4. The use as claimed in claims 1 to 3, of a composition comprising at least one chemically or physically crosslinkable polymer.
5. The use as claimed in claim 4,
- of a composition comprising
 - at least one chemically crosslinkable polymer, which is ungrafted or grafted with silane groups, and
 - a crosslinking catalyst; or
 - of a composition comprising
 - at least one chemically crosslinkable polymer, which is ungrafted or grafted with silane groups, and
 - at least one crosslinking agent chosen from peroxides; or
 - of a composition comprising
 - at least one chemically crosslinkable polymer, which is ungrafted or grafted with silane groups,
 - a crosslinking catalyst and

- at least one crosslinking agent chosen from peroxides; or
- of a composition comprising at least one polymer which is physically crosslinkable by means of a radiation chosen from UV, IR and γ (gamma) radiation.

5

6. A process for preparing an assembly chosen from containers for motor vehicles, comprising at least two elements, successively comprising:

- molding of the elements using a composition comprising at least one grafted or ungrafted crosslinkable polymer, chosen from filled or non-filled polyolefins, filled or non-filled polyamides, and polyurethanes;
- welding or bonding of the elements;
- crosslinking of the polymer.

10

7. The process as claimed in claim 6, for the preparation of an assembly chosen from a degassing tank, an expansion vessel, a power-assisted-steering liquid tank, a brake liquid tank and a windshield-washer liquid tank.

15

8. The process as claimed in claim 6 or 7, for which the filled or non-filled crosslinkable polymer is chosen from polyethylene, low-density polyethylene, high-density polyethylene and polyamide 6-6.

20

9. The process as claimed in claims 6 to 8, for which the crosslinking is performed chemically or physically.

10. The process as claimed in claim 9, for which

25

- the crosslinking is performed chemically and the composition comprises
 - at least one chemically crosslinkable polymer, which is ungrafted or grafted with silane groups, and
 - a crosslinking catalyst; or
- the crosslinking is performed chemically and the composition comprises
 - at least one chemically crosslinkable polymer, which is ungrafted or grafted with silane groups, and

30

11

- at least one crosslinking agent chosen from peroxides; or
- the crosslinking is performed chemically and the composition comprises
 - at least one chemically crosslinkable polymer, which is ungrafted or grafted with silane groups,
 - 5 ○ a crosslinking catalyst and
 - at least one crosslinking agent chosen from peroxides; or
- the crosslinking is performed physically and the composition comprises at least one polymer that is physically crosslinkable by means of a radiation chosen from UV, IR and γ (gamma) radiation.

10

11. An assembly chosen from containers for motor vehicles, comprising at least two elements and which is prepared or may be prepared according to the process of claims 6 to 10.

- 15 12. The assembly as claimed in claim 11, chosen from a degassing tank, an expansion vessel, a power-assisted-steering liquid tank, a brake liquid tank and a windshield-washer liquid tank.

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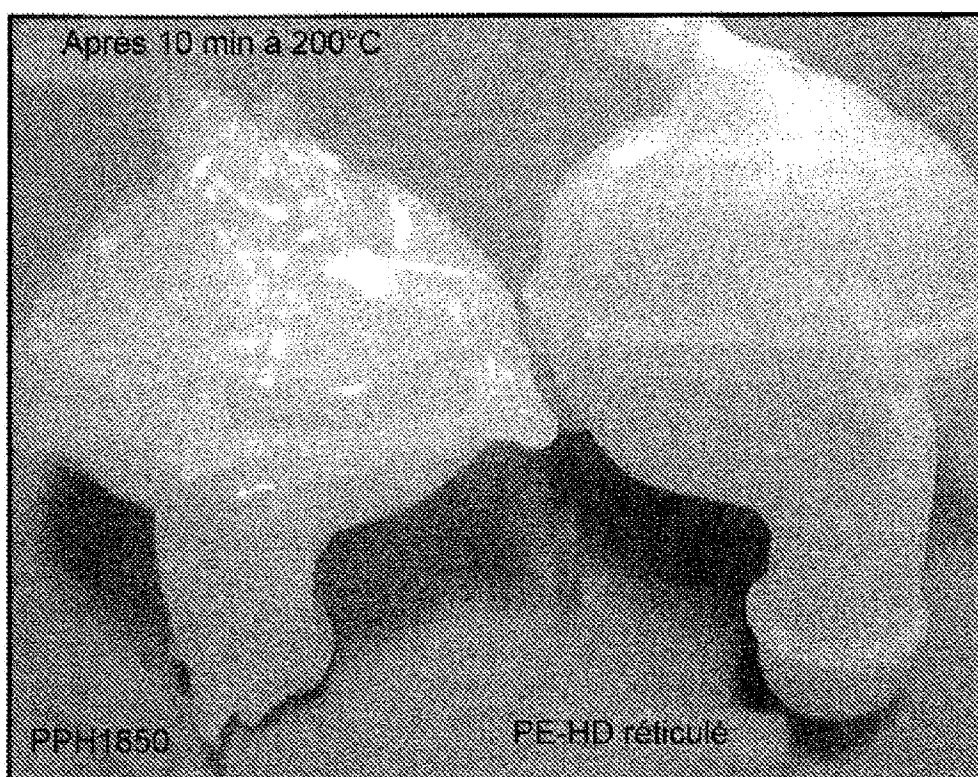


Fig.1

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2014/014888

A. CLASSIFICATION OF SUBJECT MATTER

INV. C08L51/06 C08L77/00 B65D1/00
ADD.

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)

C08L B65D

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

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

EPO-Internal, 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	JP S58 59014 A (DAINICHI NIPPON CABLES LTD) 7 April 1983 (1983-04-07) abstract; figures 1,4; example 7 -----	6-11
X	WO 01/83613 A2 (GOLAN PLASTIC PRODUCTS [IL]; BAR YOSEF [IL]) 8 November 2001 (2001-11-08) figures 1,4; example 7 -----	1-12
Y	US 2009/075004 A1 (STARITA JOSEPH M [US]) 19 March 2009 (2009-03-19) paragraph [0025] -----	1-12
Y	US 2009/075004 A1 (STARITA JOSEPH M [US]) 19 March 2009 (2009-03-19) paragraph [0025] -----	1-12
A	CA 2 461 389 A1 (ATOFINA [FR]) 21 September 2004 (2004-09-21) example 1 ----- -/--	1-12



Further documents are listed in the continuation of Box C.



See patent family annex.

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

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

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"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

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INTERNATIONAL SEARCH REPORT

International application No

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP S59 101327 A (DAINICHI NIPPON CABLES LTD) 11 June 1984 (1984-06-11) abstract -----	1-12

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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