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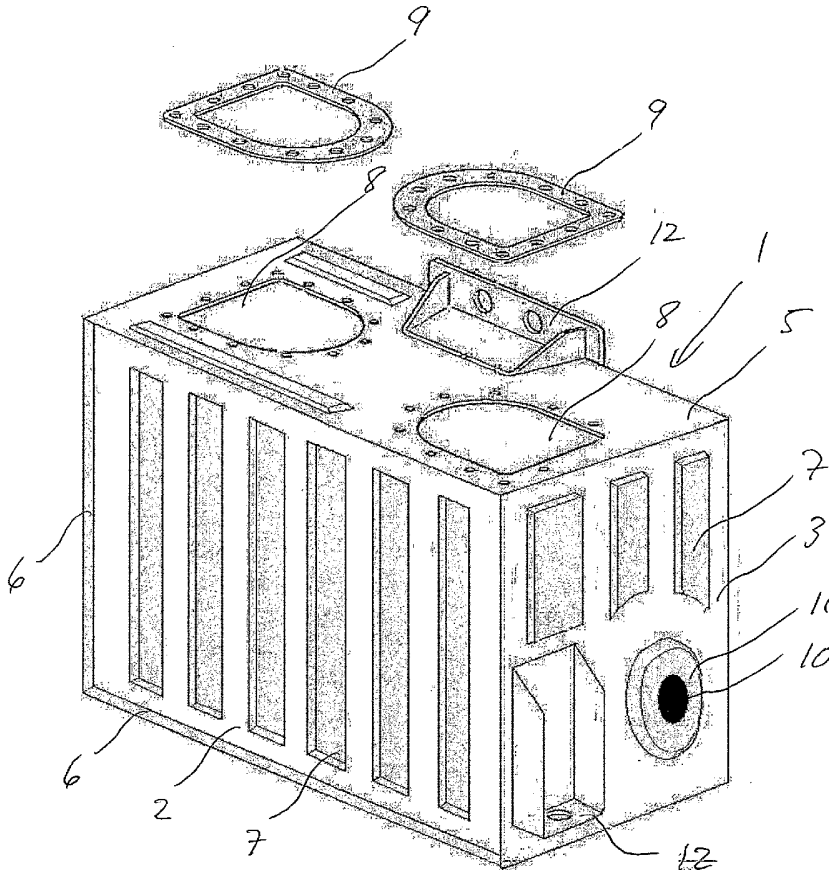
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(54) Title: CONTAINER AND METHOD OF MANUFACTURING A CONTAINER



(57) Abstract: The present invention relates to a container (1) for liquid or another fluid. The container comprises at least two wall elements (2-5) of stainless steel, which are joined by means of tape and/or glue. The present invention also relates to a method of manufacturing a container for liquid or another fluid.

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Published:

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CONTAINER AND METHOD OF MANUFACTURING A CONTAINER

The present invention relates to a container for liquid or another fluid. The invention also relates to a method of manufacturing a container for liquid or
5 another fluid.

Prior art

In the manufacturing of a container, such as a hydraulic tank, for, for instance, mobile contract machines, sheet-metal plate of carbon steel is usually
10 used. This sheet-metal plate is cut, machined and welded together into a shape and size suitable for the container. The thickness of the used sheet-metal plate is frequently 1–10 mm in order to meet requirements concerning strength and/or stiffness. During the manufacturing process, a great amount of impurities are formed, such as metallic particles and slag products. These particles are very
15 harmful in a hydraulic system, and therefore an extensive cleaning process follows after the tank has been manufactured. The cleaning process may comprise blasting/tumbling and subsequent rinsing. It may also comprise acid cleaning with subsequent neutralization and rinsing. If carbon steel is used, the tank has also to be protected against corrosion from water/condensate or other aggressive and oxida-
20 tion-inclined substances. This protection can frequently be obtained by epoxy painting or phosphating. Altogether, this gives a laborious and time-consuming process.

DE, A1, 29 15 279 shows a container and method for filling. An interior lining of stainless steel is glued against the sides of an external container. On the
25 other hand, the parts of the internal lining are welded together. The construction is unnecessary complicated and thereby expensive to manufacture.

Summary of the invention

A first object of the present invention is to provide a container that is rela-
30 tively simple and thereby inexpensive to manufacture. A second object of the present invention is to provide a container of a moderate weight. A third object of the present invention is to provide a container that can be used in applications where there are high requirements of purity. A fourth object of the present invention is to provide a container that can be delivered in parts to users for assembly on-site.

Thus, the invention comprises a container for liquid or another fluid. The container comprises at least two wall elements of stainless steel, which are joined by means of tape and/or glue.

Said at least two wall elements may be joined along at least one flange particularly intended for the purpose and present on one of said at least two wall elements. Said stainless steel may be austenitic. Said tape and/or glue may act joiningly as well as sealingly. At least one of said wall elements may exhibit a strain hardening as a consequence of forming of the wall element in question. Said at least one wall element may have a stiffness and/or strength that is 4–7 times greater than the stiffness and/or the strength of an unformed wall element of the corresponding wall thickness. Said at least one wall element may have at least one groove made by forming, such as pressing or the like.

Thus, the invention also comprises a method of manufacturing a container for liquid or another fluid. The method comprises the steps of manufacturing at least two wall elements from stainless steel and joining said wall elements by means of tape and/or glue.

Said at least two wall elements may be joined along at least one flange particularly intended for the purpose and present on one of said at least two wall elements. Said stainless steel may be austenitic. Said tape and/or glue may act joiningly as well as sealingly. At least one of said wall elements may, before said joining by means of tape and/or glue, be formed with the purpose of giving rise to a strain hardening of the wall element in question. At least one groove may be made in said at least one wall element by forming, such as pressing or the like.

25 **List of drawings**

Figure 1 shows, in a partly exploded perspective view and in principle, a container according to the invention.

Description of embodiments

30 From figure 1, it is evident how the container 1 according to the invention looks. The container 1 is rectangular having six sides or wall elements 2–5, of which two are long sides 2, two are short sides 3, one is a bottom side 4, and one is a top side 5. The sides 2–5 are manufactured from ultrapure sheet-metal plate, i.e., cold-rolled sheet-metal plate, of austenitic stainless steel in a layer having a

thickness of approx. 0.1–1.0 mm, preferably approx. 0.3–0.4 mm. Each one of the occurring outer edges on each one of the long sides 2 is provided with a flange 6, which extends along the respective outer edge and which extends in a plane that forms primarily a right angle with the principal plane of extension for the respective long side 2, and which is outwardly directed from the container 1. The respective
5 said flange 6 meets, preferably along its entire surface, the respective said side 3–5 of said two short sides 3, one bottom side 4 and one top side 5, the respective said flange 6 being united by agglutination with the respective said side 3–5. The agglutination not only holds the sides 2–5 together but also seals occurring joints
10 between the sides 2–5 so that a fluidproof connection is obtained.

Each one of the sides 2–5 is provided with grooves 7, which have been made upon the forming of the sides 2–5 by pressing or in any other known expedient way. By the forming, a strain hardening/cold hardening of the material included in the sides is achieved. In this way, the stiffness and/or the strength of
15 the sheet-metal material included in the sides increases by 4–7 times, for which reason the thickness of the sheet-metal plate included in the sides can be decreased correspondingly with retained stiffness and/or strength.

Furthermore, two first punched and/or cut openings 8 are present on the container 1 for the mounting of equipment/accessories on/in the container 1. In
20 figure 1, two occurring borders/adapters 9 are also shown for threaded joints and for the mounting of equipment/accessories on the container 1. A second punched and/or cut opening 10 having a stiffener 11 is present for the connection of additional accessories for the container 1 by, for instance, agglutination. Two glued fasteners 12 are present to allow the container 1, in turn, to be mounted on and/or
25 in another equipment.

Thus, in the manufacturing of the container 1, one begins with making the sides or the wall elements 2–5 by forming such as pressing, not only the sides 2–5 being made according to their outer dimensions but also being imparted a strain hardening by the provision of occurring grooves 7, as well as the sides 2–5 being
30 prepared for a convenient joining by the fact that the flanges 6 are provided. Occurring openings may either be punched and/or cut in connection with the forming or be punched and/or cut at a later stage of the manufacturing. Most common is that occurring openings are punched in connection with conventional pressing. When the sides 2–5 are present, the same are joined to a finished con-

tainer 1 by agglutination, tape and/or glue being applied to the occurring flanges 6 and/or to the surfaces of the sides 3–5 that the same are going to meet after which the meeting surfaces are pressed together. The joining may be effected in connection with the manufacture of the sides 2–5 of the container 1 or in connection with the manufacture of a device in which the container 1 is included as a part, or also at the end user of the container 1 and/or of the device in which the container 1 is included. If the joining takes place at a later stage, the included parts of the container 1 can be transported to users in a convenient and economical way. A user may particularly easily mount the container by means of an appropriate form of a known, double-sidedly sticking tape, but also any other known expedient types of tape and/or glue may be used.

The basic material used in the manufacture of the sides 2–5, i.e., sheet-metal plates of austenitic stainless steel or another stainless steel of a similar quality, is selected to have a surface structure that is very fine and therefore easy to clean. The surface structure is calendered to a surface finish better than Ra 0.2. The selected material is free from oxide scale and other oxidation products. For this material, no surface treatment is required in order to prevent corrosion such as rust caused by condensate and/or by flushing with water. Generally, the service life of a system in which the container 1 is included can be extended by a careful cleaning of components and/or details included, which is facilitated in the embodiment of the container 1 described herein.

Occurring pressing may be effected by a conventional hydraulic press, eccentric press or any other known expedient press, or forming may be effected by hydroforming technique or any other known expedient forming.

Occurring long sides 2 may have flanges 6 to a smaller extent than what is seen in the described embodiment. Thus, each one of the long sides 2 may have flanges 6 along no one, one, two, three or four of its occurring outer edges. Correspondingly, the other sides 3–5 may have flanges 6 to a greater extent than what is seen in the described embodiment. Thus, each one of said two short sides 3, one bottom side 4, and one top side 5 may have flanges 6 along no one, one, two, three or four of its occurring outer edges.

Occurring long sides 2 may, for instance, have flanges 6 along only two of the four outer edges thereof, for instance only along the outer edges that extend primarily vertically in figure 1, the bottom side 4 and top side 5 instead, in an

analogous way, being equipped with flanges along the outer edges that extend primarily horizontally in figure 1 in such a way that everywhere, where one of the sides 2–5 meets another one of the sides 2–5 in the container 1, a flange 6 is always present on someone of the sides 2–5 along the edge in question for the
5 abutment and sealing agglutination against the meeting surface intended therefor. Occurring agglutination may also be supplemented with rivet and/or screw joints.

Occurring borders/adapters 9 may be glued in place on the container 1 and be equipped with threads for complementary mounting of filter, pump equipment, surveillance equipment or the like.

10 Even if a one-layer sheet-metal is used in the manufacture of the sides 2–5 according to the above, it is also feasible to use a two-layer or multi-layer sheet-metal. The container 1 is intended to resist moderate positive pressures of up to approx. 1.5 bar. The grooves 7, the openings 8, 10, the borders/adapters 9, the stiffeners 11 and the fasteners 12 may of course vary in number and/or execution
15 or, where appropriate, entirely be lacking without deviating from the general idea of the invention.

The container 1 according to the invention is particularly suitable for hydraulic fluids or similar fluids that have to maintain a low impurity level. Thus, suitable fields of application are as a hydraulic tank for mobile or stationary
20 hydraulic systems or as a fuel tank for vehicles at land or sea but also many other fields of application are feasible. The container 1 is relatively simple and thereby inexpensive to manufacture and it has a relatively low weight.

The invention is not limited to the embodiments shown here but may be varied within the scope of the subsequent claims.

CLAIMS

1. Container (1) for liquid or another fluid, **characterized** by at least two wall elements (2–5) of stainless steel, which are joined by means of tape and/or glue.
- 5
2. Container according to claim 1, wherein said at least two wall elements (2–5) are joined along at least one flange (6) particularly intended for the purpose and present on one of said at least two wall elements (2–5).
- 10
3. Container according to any one of the preceding claims, wherein said stainless steel is austenitic.
4. Container according to any one of the preceding claims, wherein said tape and/or glue acts joiningly as well as sealingly.
- 15
5. Container according to any one of the preceding claims, wherein at least one of said wall elements (2–5) shows a strain hardening as a consequence of forming of the wall element (2–5) in question.
- 20
6. Container according to claim 5, wherein said at least one wall element (2–5) shows a stiffness and/or strength that is 4–7 times greater than the stiffness and/or strength of an unformed wall element (2–5) of the corresponding wall thickness.
- 25
7. Container according to any one of the claims 5 and/or 6, wherein said at least one wall element (2–5) shows at least one groove (7) made by forming, such as pressing or the like.
- 30
8. Method of manufacturing a container for liquid or another fluid, **characterized** in that
- at least two wall elements (2–5) are manufactured from stainless steel and
 - said wall elements (2–5) are joined by means of tape and/or glue.

9. Method according to claim 8, wherein said at least two wall elements (2–5) are joined along at least one flange (6) particularly intended for the purpose and present on one of said at least two wall elements (2–5).
- 5 10. Method according to any one of the claims 8 and/or 9, wherein said stainless steel is austenitic.
11. Method according to any one of the claims 8–10, wherein said tape and/or glue acts joiningly as well as sealingly.
- 10 12. Method according to any one of the claims 8–11, wherein at least one of said wall elements (2–5), before said joining by means of tape and/or glue, is formed with the purpose of giving rise to a strain hardening of the wall element (2–5) in question.
- 15 13. Method according to claim 12, wherein at least one groove (7) in said at least one wall element is made by forming, such as pressing or the like.
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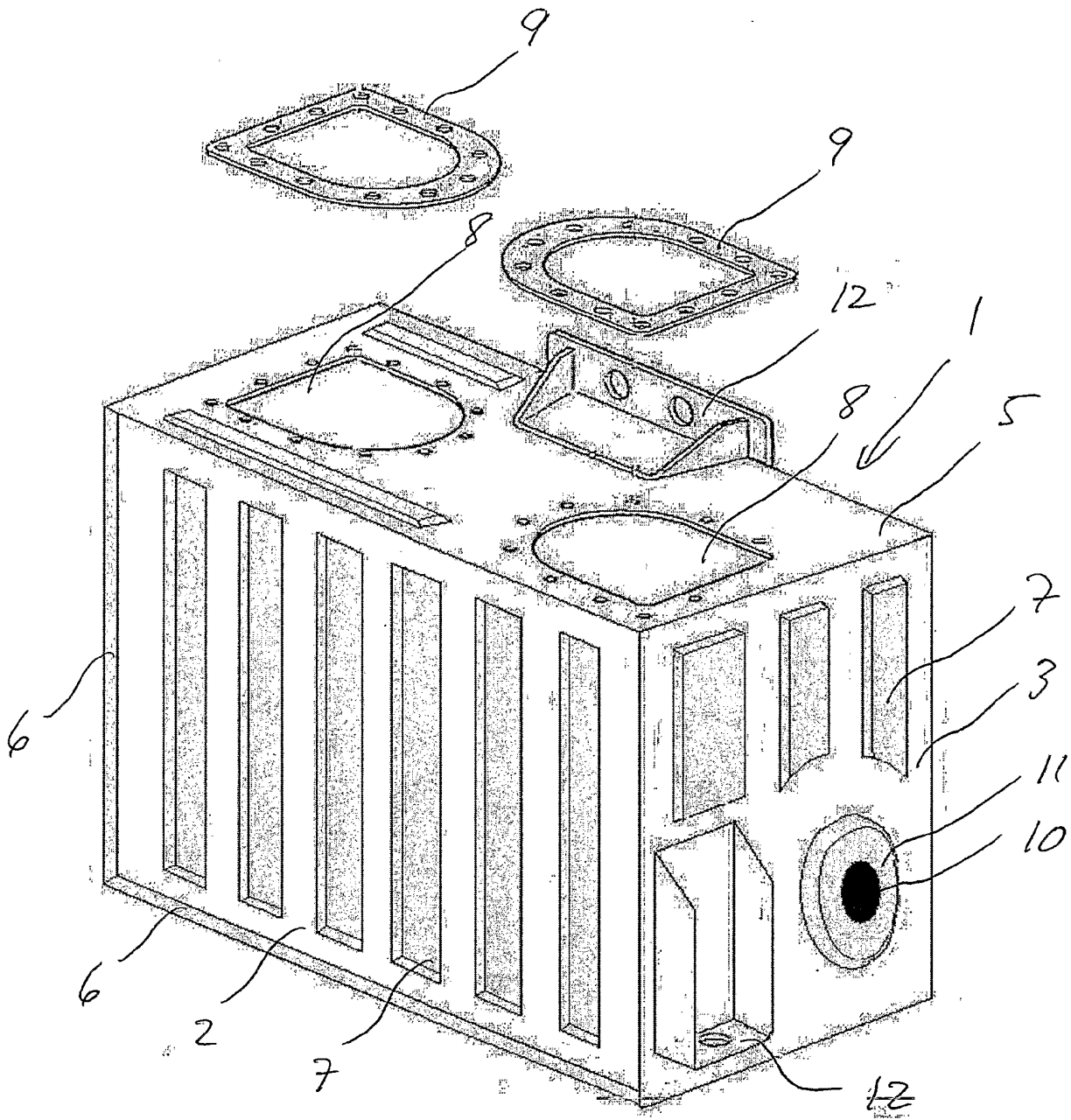


Fig 1

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE2006/000115

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: B21D, B60K, F16B

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, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
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| A | US 4131980 A (ZINNBAUER), 2 January 1979 (02.01.1979), abstract -- | 1-13 |
| A | US 6050330 A (SCHMIT ET AL), 18 April 2000 (18.04.2000), abstract -- | 1-13 |
| A | DE 3422973 A1 (HOFMANN, GOTTFRIED), 28 February 1985 (28.02.1985), abstract -- ----- | 1-13 |

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Cited literature, if any, will be enclosed in paper form.

INTERNATIONAL SEARCH REPORT

Information on patent family members

04/03/2006

International application No.

PCT/SE2006/000115

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