Abstract

An end fitting for a cylindrical high pressure vessel made from components all having thin walls, thereby tripling the practical diameter of such pressure vessels. The end fitting includes a toroidal shell defining a hole; centrally disposed piece for closing the hole comprising a pipe and a center end fitting and structural members. In a first embodiment, the structural members comprise slices of an end of the pipe welded to the outer cylindrical wall of the vessel. In a second embodiment, the structural members are plates connecting the pipe to the outer cylindrical walls. In the third embodiment, the plates connect an extension of the outer cylindrical wall beyond the toroidal shell to an extension of the outer cylindrical wall of the pressure vessel. The center end fitting may be hemispheric or ellipsoidal.
### A. CLASSIFICATION OF SUBJECT MATTER

**IPC:**
F17C 1/00 (2006.01); F16L 13/02 (2006.01)

**USPC:** 202/585.285/288.1

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)

U.S.: Please see Continuation Sheet

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

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

### C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>US 3,050,210 A (SHANG) 21 August 1962 (21.08.1962), see entire document.</td>
<td>1-9, 11-20</td>
</tr>
<tr>
<td>Y</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Y</td>
<td>US 3,537,938 A (CLEMENTS) 03 November 1970 (03.11.1970), see entire document.</td>
<td>10</td>
</tr>
</tbody>
</table>

Further documents are listed in the continuation of Box C.

See patent family annex.

**Date of the actual completion of the international search:**
30 November 2009 (30.11.2009)

**Date of mailing of the international search report:**
15 Dec 2009

**Name and mailing address of the ISA/US**
Mail Stop PCT, Attn: ISA/US
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
Facsimile No. (571) 273-3201

**Authorized officer:**
Bill Kryski

**Telephone No.:** (571) 272.1024

Form PCT/ISA/210 (second sheet) (April 2007)
Continuation of B. FIELDS SEARCHED Item 1: