COOPERATIVE PATENT CLASSIFICATION

MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING

ENGINEERING IN GENERAL

STORING OR DISTRIBUTING GASES OR LIQUIDS

VESSELS FOR CONTAINING OR STORING COMPRESSED, LIQUEFIED OR SOLIDIFIED GASES; FIXED-CAPACITY GAS-HOLDERS; FILLING VESSELS WITH, OR DISCHARGING FROM VESSELS, COMPRESSED, LIQUEFIED, OR SOLIDIFIED GASES (storing fluids in natural or artificial cavities or chambers in the earth B65G 5/00; construction or assembling of bulk storage containers employing civil-engineering techniques E04H 7/00; variable-capacity gas-holders F17B; liquefaction or refrigeration machines, plants, or systems F25)

WARNING

In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

1/00 Pressure vessels, e.g. gas cylinder, gas tank, replaceable cartridge (pressurised apparatus for purposes other than storage, see the relevant subclasses such as A62C, B05B; associated with vehicles, see the appropriate subclass of classes B60 - B64; pressure vessels in general F16J 1/00; autoclaves B01J 3/04; tank vehicles B60P 3/22; railway tank wagons for carrying fluent materials B61D 5/00; accumulators for supplying fluid under pressure F15B 1/04; liquefied gas stoves F24C 3/00)

1/002 . (Storage in barges or on ships)
1/005 . (Storage of gas or gaseous mixture at high pressure and at high density condition, e.g. in the single state phase)
1/007 . (Underground or underwater storage)
1/02 . involving reinforcing arrangements { [F17C 1/14, F17C 1/16 take precedence] }
1/04 . . Protecting sheathings
1/06 . . . built-up from wound-on bands or filamentary material, e.g. wires
1/08 . . . Integral reinforcements, e.g. ribs
1/10 . with provision for protection against corrosion, e.g. due to gaseous acid { [F17C 1/14, F17C 1/16 take precedence]; inhibiting corrosion of metallic material or incrustation in general C23F }
1/12 . with provision for thermal insulation { [F17C 1/14, F17C 1/16 take precedence]; thermal insulation in general F16L 59/00 }
1/14 . constructed of aluminium; constructed of non-magnetic steel
1/16 . constructed of plastics materials { (shaping of plastics B29C) }
3/00 Vessels not under pressure
3/005 . (Underground or underwater containers or vessels (storing in natural or artificial cavities in the earth in general B65G 5/00)]
3/02 . with provision for thermal insulation (thermal insulation in general F16L 59/00; refrigerators F25D; insulation specially adapted for cryogenic vessels F17C 13/001; tank vehicles B60P 3/22; railway tank wagons B61D 5/001)
3/022 . . (Land-based bulk storage containers (civil engineering aspects E04H 7/00))
3/025 . . (Bulk storage in barges or on ships (constructive aspects B63B 25/16))
3/027 . . . (Wallpanels for so-called membrane tanks)
3/04 . . by insulating layers (F17C 3/08 takes precedence)
3/06 . . . on the inner surface, i.e. in contact with the stored fluid
3/08 . . by vacuum spaces, e.g. Dewar flask (for household use A47J 41/02)
3/085 . . . (Cryostats)
3/10 . . by liquid-circulating or vapour-circulating jackets
3/12 . . with provision for protection against corrosion, e.g. due to gaseous acid (protection against corrosion in general C23F)
5/00 Methods or apparatus for filling containers with liquefied, solidified, or compressed gases under pressures (adding propellants to aerosol containers B65B 31/00)

NOTE

This group includes not only the filling of vessels for storage of compressed or liquefied gases, but also the filling of pressurised apparatus insofar as it is not covered by a single other subclass, e.g. A62C, B05B.

5/002 . (Automated filling apparatus)
5/005 . . (for gas bottles, such as on a continuous belt or on a merry-go-round)
5/007 . . (for individual gas tanks or containers, e.g. in vehicles (filling with liquid fuel not under pressure, B60S 5/02, B67D 7/00))
Methods and apparatus for filling vessels not under pressure with liquefied or solidified gases

Methods or apparatus for discharging liquefied, solidified, or compressed gases from pressure vessels, not covered by another subclass

Details of vessels or of the filling or discharging of vessels

Use of gas-solvents or gas-sorbents in vessels

Vessel construction, in particular geometry, arrangement or size

Vessel construction using filling material in contact with the handled fluid
structures of walls or their materials

2203/0641 . . . Non-magnetic steels
2203/0643 . . . Stainless steels
2203/0646 . . . Aluminium
2203/0648 . . . Alloys or compositions of metals
2203/0651 . . . Invar
2203/0653 . . . Lead
2203/0656 . . . in form of filaments
2203/0658 . . . Synthetics
2203/066 . . . Plastics
2203/0663 . . . in form of fibers or filaments
2203/0665 . . . radially wound
2203/0668 . . . axially wound

2205/00 Vessel construction, in particular mounting arrangements, attachments or identifications means

2205/01 . . . Mounting arrangements
2205/0103 . . . Exterior arrangements
2205/0107 . . . Frames
2205/0111 . . . Boxes
2205/0115 . . . Dismountable protective hulls
2205/0119 . . . Vessel walls form part of another structure
2205/0123 . . . characterised by number of vessels
2205/0126 . . . One vessel
2205/013 . . . Two or more vessels
2205/0134 . . . characterised by the presence of fluid connection between vessels
2205/0138 . . . bundled in series
2205/0142 . . . bundled in parallel
2205/0146 . . . with details of the manifold
2205/0149 . . . Vessel mounted inside another one
2205/0153 . . . Details of mounting arrangements
2205/0157 . . . for transport
2205/0161 . . . with wheels
2205/0165 . . . with handgrip
2205/0169 . . . stackable
2205/0173 . . . lockable
2205/0176 . . . with ventilation
2205/018 . . . Supporting feet
2205/0184 . . . Attachments to the ground, e.g. mooring or anchoring
2205/0188 . . . Hanging up devices
2205/0192 . . . with external bearing means
2205/0196 . . . with shock absorbing means
2205/03 . . . Fluid connections, filters, valves, closure means or other attachments
2205/0302 . . . Fittings, valves, filters, or components in connection with the gas storage device
2205/0305 . . . Bosses, e.g. boss collars
2205/0308 . . . Protective caps
2205/0311 . . . Closure means
2205/0314 . . . breakable, e.g. with burst discs
2205/0317 . . . fusing or melting
2205/032 . . . pierceable
2205/0323 . . . Valves
2205/0326 . . . electrically actuated
2205/0329 . . . manually actuated
2205/0332 . . . Safety valves or pressure relief valves
2205/0335 . . . Check-valves or non-return valves
2205/0338 . . . Pressure regulators
2205/0341 . . . Filters
2205/0344 . . . Sinter type
Vessel construction, in particular methods of manufacturing

- Shaping processes
  - Moulding
  - by injection
  - by blowing
  - using wax moulds
  - by rotation
  - Winding
  - with a mandrel
  - Polishing
  - Metal working processes, e.g. deep drawing, stamping or cutting
  - Working processes for non metal materials, e.g. extruding

- Assembling processes
  - by friction
  - Press-fitting; Shrink-fitting
  - Spraying
  - by adhesive means
  - by screws, bolts or rivets
  - Manufacturing of particular parts or at special locations
  - of walls
  - of closing end pieces, e.g. caps
  - Apparatus therefore
  - Filling of insulants

Handled fluid, in particular type of fluid

- Pure fluids
- Oxygen
- Hydrogen
- Carbon dioxide
- Nitrogen
- Carbon monoxide
- Noble gases (Ar, Kr, Xe)

- Fluid contained in the vessel: Filling and discharging the fluid

- Handled fluid before transfer, i.e. state of fluid when stored in the vessel or before transfer from the vessel
- characterised by the phase
- Single phase
- dense or supercritical, i.e. at high pressure and high density
- gaseous, e.g. CNG, GNC
- liquid
- solid
- Two-phase
- Liquefied gas, e.g. LPG, GPL
- cryogenic, e.g. LNG, GNL, PLNG
- subcooled
- Solids and gas
- Liquids and solids
- Three-phase, e.g. CO₂ at triple point
- characterised by the pressure level
- Not under pressure, i.e. containing liquids or solids only
- Small pressure, e.g. for liquefied gas
- High pressure (>10 bar)
- Very high pressure (>80 bar)
- Subatmospheric pressure
- characterised by other properties of handled fluid before transfer
- Stratification
- Localisation of the removal point
- in the gas
- with a dip tube
- in the liquid
- with a dip tube
- in the solid

- Handled fluid after transfer, i.e. state of fluid after transfer from the vessel
- characterised by the phase
- Single phase
- dense or supercritical, i.e. at high pressure and high density
- gaseous, e.g. CNG, GNC
- liquid
- solid
- Two-phase
- Liquefied gas, e.g. LPG, GPL
- cryogenic, e.g. LNG, GNL, PLNG
Fluid contained in the vessel; Filling and discharging the fluid

2227/0169 . . . . subcooled
2227/0176 . . . . Solids and gas
2227/0184 . . . . Liquids and solids
2227/0192 . . . . Three-phase, e.g. CO\textsubscript{2} at triple point
2227/0231 . . . Not under pressure, i.e. containing liquids or solids only
2227/0332 . . . . Small pressure, e.g. for liquefied gas
2227/0335 . . . . High pressure, i.e. between 10 and 80 bars
2227/0337 . . . . Very high pressure, i.e. above 80 bars
2227/0338 . . . . Subatmospheric pressure
2227/0431 . . . . characterised by the pressure level
2227/0432 . . . . characterised by other properties of handled fluid
2227/0433 . . . in the gas
2227/0445 . . . . at several points, e.g. with a device for recondensing gas
2227/0446 . . . . in the liquid
2227/0447 . . . . with a dip tube
2227/0448 . . . . in the solid

2227/00 Transfer of fluids, i.e. method or means for transferring the fluid; Heat exchange with the fluid

2227/01 . . . . Propulsion of the fluid
2227/0107 . . . . by pressurising the ullage
2227/0114 . . . . with vacuum injectors, e.g. venturi
2227/0121 . . . . by gravity
2227/0128 . . . . with pumps or compressors
2227/0135 . . . . Pumps
2227/0142 . . . . with specified pump type, e.g. piston or impulsive type
2227/015 . . . . with cooling of the pump
2227/0157 . . . . Compressors
2227/0164 . . . . with specified compressor type, e.g. piston or impulsive type
2227/0171 . . . . Arrangement
2227/0178 . . . . in the vessel
2227/0185 . . . . comprising several pumps or compressors
2227/0192 . . . . by using a working fluid
2227/0203 . . . . Heat exchange with the fluid
2227/0204 . . . . by heating
2227/0205 . . . . using an electric heater
2227/0206 . . . . using the same fluid
2227/0207 . . . . using another fluid
2227/0211 . . . . Air heating
2227/0213 . . . . . . by forced circulation, e.g. using a fan
2227/0216 . . . . Water heating
2227/0218 . . . . using seawater
2227/0222 . . . . using geothermal water
2227/0233 . . . . in a closed loop
2227/0235 . . . . by expansion using "Joule-Thompson" effect
2227/0237 . . . . with recovery of heat
2227/0238 . . . . using solar energy
2227/0239 . . . . by burning a combustible
2227/0234 . . . . by radiation means
2227/0237 . . . . by cooling
2227/0240 . . . . using another fluid
2227/0244 . . . . Air cooling

2227/0346 . . . . by forced circulation, e.g. using a fan
2227/0348 . . . . Water cooling
2227/0351 . . . . using seawater
2227/0353 . . . . using cryocooler
2227/0355 . . . . in a closed loop
2227/0358 . . . . by expansion
2227/036 . . . . "Joule-Thompson" effect
2227/0362 . . . . in a turbine
2227/0365 . . . . with recovery of heat
2227/0367 . . . . Localisation of heat exchange
2227/0369 . . . . in or on a vessel
2227/0372 . . . . in the gas
2227/0374 . . . . in the liquid
2227/0376 . . . . in wall contact
2227/0379 . . . . inside the vessel
2227/0381 . . . . integrated in the wall
2227/0383 . . . . outside the vessel
2227/0386 . . . . with a jacket
2227/0388 . . . . separate
2227/039 . . . . on the pipes
2227/0393 . . . . using a vapouriser
2227/0395 . . . . using a submerged heat exchanger
2227/0397 . . . . characterised by fins
2227/0404 . . . . Methods for emptying or filling
2227/041 . . . . vessel by vessel
2227/042 . . . . with change-over from one vessel to another
2227/043 . . . . by pressure cascade
2227/044 . . . . by purging
2227/045 . . . . by vacuum
2227/046 . . . . by even emptying or filling
2227/047 . . . . by repeating a process cycle
2227/048 . . . . by maintaining residual pressure
Fluid contained in the vessel; Filling and discharging the fluid

2260/046 . . . Enhancing energy recovery
2260/048 . . . Refurbishing
2260/05 . . . Improving chemical properties
2260/053 . . . Reducing corrosion
2260/056 . . . Improving fluid characteristics

Purposes or effects

2265/00 Effects achieved by gas storage or gas handling
2265/01 . . . Purifying the fluid
2265/012 . . . by filtering
2265/015 . . . by separating
2265/017 . . . different phases of a same fluid
2265/02 . . . Mixing fluids
2265/022 . . . identical fluid
2265/025 . . . different fluids
2265/027 . . . with odorizing
2265/03 . . . Treating the boil-off
2265/031 . . . by discharge
2265/032 . . . by recovery
2265/033 . . . with cooling
2265/034 . . . with condensing the gas phase
2265/035 . . . with subcooling the liquid phase
2265/036 . . . with heating
2265/037 . . . with pressurising
2265/038 . . . with expanding
2265/04 . . . using an independent energy source, e.g. battery
2265/05 . . . Regasification
2265/06 . . . Fluid distribution
2265/061 . . . for supply of supplying vehicles
2265/063 . . . for supply of refueling stations
2265/065 . . . for refueling vehicle fuel tanks
2265/066 . . . for feeding engines for propulsion
2265/068 . . . Distribution pipeline networks
2265/07 . . . Generating electrical power as side effect

2270/00 Applications
2270/01 . . . for fluid transport or storage
2270/0102 . . . on or in the water
2270/0105 . . . Ships
2270/0107 . . . Wall panels
2270/011 . . . Barges
2270/0113 . . . floating
2270/0115 . . . immersed
2270/0118 . . . Offshore
2270/0121 . . . Platforms
2270/0123 . . . Terminals
2270/0126 . . . Buos
2270/0128 . . . Storage in depth
2270/0131 . . . Submarines
2270/0134 . . . placed above the ground
2270/0136 . . . Terminals
2270/0139 . . . Fuel stations
2270/0142 . . . placed underground
2270/0144 . . . Type of cavity
2270/0147 . . . by burying vessels
2270/0149 . . . by digging cavities
2270/0152 . . . Salt caverns
2270/0155 . . . by using natural cavities
2270/0157 . . . Location of cavity
2270/016 . . . onshore
2270/0163 . . . offshore
Purposes or effects

2270/0165 . . . on the road
2270/0168 . . . by vehicles
2270/0171 . . . Trucks
2270/0173 . . . Railways
2270/0176 . . . Buses
2270/0178 . . . Cars
2270/0181 . . . Airbags
2270/0184 . . . Fuel cells
2270/0186 . . . in the air or in space
2270/0189 . . . Planes
2270/0192 . . . Hot air balloons
2270/0194 . . . for use under microgravity conditions, e.g. space
2270/0197 . . . Rockets
2270/02 . . for medical applications
2270/025 . . Breathing
2270/05 . . for industrial use
2270/0509 . . "Dewar" vessels
2270/0518 . . Semiconductors
2270/0527 . . Superconductors
2270/0536 . . Magnetic resonance imaging
2270/0545 . . Tools
2270/0554 . . Hydraulic applications
2270/0563 . . Pneumatic applications
2270/0572 . . Isostatic presses
2270/0581 . . Power plants
2270/059 . . Mass bottling, e.g. merry belts
2270/07 . . for household use
2270/0709 . . Camping gas
2270/0718 . . Aerosols
2270/0727 . . Thermos flasks
2270/0736 . . Capsules, e.g. CO₂
2270/0745 . . Gas bottles
2270/0754 . . Fire extinguishers
2270/0763 . . Fuel cells
2270/0772 . . Inflation devices, e.g. for rescue vests or tyres
2270/0781 . . Diving equipments
2270/079 . . Respiration devices for rescuing