

## SECTION F — MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING

### F16 ENGINEERING ELEMENTS OR UNITS; GENERAL MEASURES FOR PRODUCING AND MAINTAINING EFFECTIVE FUNCTIONING OF MACHINES OR INSTALLATIONS; THERMAL INSULATION IN GENERAL

#### F16J PISTONS; CYLINDERS; PRESSURE VESSELS IN GENERAL; SEALINGS

##### Note(s)

Attention is drawn to the following places:

A47J 27/08.....	Pressure cookers
E04B 1/68.....	Sealing building joints
E05C 9/00.....	Multi-point fastening of wings in general
F01B.....	Machines or engines in general or of reciprocating type, e.g. cylinders peculiar to steam engines
	F01B 31/28
F02F 1/00.....	Cylinders for combustion engines
F02F 3/00.....	Pistons for combustion engines
F04D 29/08.....	Sealings of non-positive displacement pumps
F17B 1/04.....	Sealing devices for sliding parts of gas holders of variable capacity
F28F 9/04.....	Arrangements for sealing elements into header boxes or end plates of heat-exchangers.

##### Subclass index

PISTONS, TRUNK PISTONS, OR PLUNGERS; PISTON-RODS.....	1/00, 7/00
DIAPHRAGMS, BELLOWS, BELLOWS PISTONS; PISTON-RINGS.....	3/00, 9/00
CYLINDERS, HOLLOW BODIES.....	10/00
PRESSURE VESSELS; COVERS.....	12/00, 13/00
SEALINGS.....	15/00

<b>1/00</b>	<b>Pistons; Trunk pistons; Plungers</b> (bellows pistons F16J 3/06; piston-rings or seats therefor F16J 9/00; rotary pistons, e.g. for "Wankel" type engines, F01C; specific for combustion engines, i.e. constructed to withstand high temperature or modified for guiding, igniting, vaporising, or otherwise treating the charge, F02F; pistons specially adapted for reciprocating-piston liquid engines F03C 1/28; for pumps F04B; floats F16K 33/00)	1/22	• • • with universal joint, e.g. ball-joint
		1/24	• • designed to give the piston some rotary movement about its axis
		<b>3/00</b>	<b>Diaphragms; Bellows; Bellows pistons</b> (connection of valves to inflatable elastic bodies B60C 29/00; bellows or the like used in instruments G12B 1/04; diaphragms for electromechanical transducers H04R 7/00)
		3/02	• Diaphragms [2]
1/01	• characterised by the use of particular materials (F16J 1/02 takes precedence) [3]	3/04	• Bellows [2]
1/02	• Bearing surfaces	3/06	• Bellows pistons [2]
1/04	• Resilient guiding parts, e.g. skirts, particularly for trunk pistons	<b>7/00</b>	<b>Piston-rods, i.e. rods rigidly connected to the piston</b> (connecting-rods or like links pivoted at both ends F16C 7/00)
1/06	• • with separate expansion members; Expansion members	<b>9/00</b>	<b>Piston-rings, seats therefor; Ring sealings of similar construction in general</b> (other sealings between pistons and cylinders F16J 3/06, F16J 15/16; tools for mounting or removing piston-rings or the like B25B; piston sealing arrangements on brake master cylinders B60T 11/236) [2, 5]
1/08	• Constructional features providing for lubrication		
1/09	• with means for guiding fluids (F16J 1/08 takes precedence) [3]	9/02	• L-section rings
1/10	• Connection to driving members	9/04	• Helical rings
1/12	• • with piston-rods, i.e. rigid connections	9/06	• using separate springs expanding the rings; Springs therefor
1/14	• • with connecting-rods, i.e. pivotal connections	9/08	• with expansion obtained by pressure of the medium
1/16	• • • with gudgeon-pin; Gudgeon-pins		
1/18	• • • • Securing of gudgeon-pins		
1/20	• • • with rolling contact, other than in ball or roller bearings		

## F16J

- 9/10 • Special members for adjusting the rings
- 9/12 • Details
- 9/14 • • Joint-closures
- 9/16 • • • obtained by stacking of rings
- 9/18 • • • with separate bridge-elements
- 9/20 • • Rings with special cross-section (L-section rings F16J 9/02); Oil-scraping rings
- 9/22 • • Rings for preventing wear of grooves or like seatings
- 9/24 • • Members preventing rotation of rings in grooves
- 9/26 • characterised by the use of particular materials [3]
- 9/28 • • of non-metals [3]
- 10/00 Engine or like cylinders** (pressure vessels in general F16J 12/00; cylinders for engines or other apparatus of particular kinds, *see* the appropriate subclasses, e.g. for combustion engines F02F); **Features of hollow, e.g. cylindrical, bodies in general** [3]
- 10/02 • Cylinders designed to receive moving pistons or plungers [3]
- 10/04 • • Running faces; Liners [3]
- 12/00 Pressure vessels in general** (covers therefor F16J 13/00; for particular applications, *see* the relevant subclasses, e.g. B01J, F17C, G21C) [3]
- 13/00 Covers or similar closure members for pressure vessels in general** (for engine or like cylinders F16J 10/00; sealings F16J 15/02; covers for box-like containers B65D 43/00; devices for securing or retaining closure members B65D 45/00; closures for containers not otherwise provided for B65D 51/00; manholes, covers for large containers B65D 90/10; gates or closures for large containers B65D 90/54; for vessels for containing or storing compressed, liquefied or solidified gases F17C 13/06; steam boilers F22B)
- 13/02 • Detachable closure members; Means for tightening closures (F16J 13/16, F16J 13/22 take precedence) [3]
- 13/04 • • attached with a bridge member
- 13/06 • • attached only by clamps along the circumference
- 13/08 • • attached by one or more members actuated to project behind a part or parts of the frame (similar constructions for doors or windows E05C 9/00)
- 13/10 • • attached by means of a divided ring
- 13/12 • • attached by wedging action by means of screw-thread, interrupted screw-thread, bayonet closure, or the like
- 13/14 • • attached exclusively by spring action or elastic action
- 13/16 • Pivoted closures (F16J 13/22 takes precedence) [3]
- 13/18 • • pivoted directly on the frame
- 13/20 • • mounted by mobile fastening on swinging arms
- 13/22 • with movement parallel to the plane of the opening [3]
- 13/24 • with safety devices, e.g. to prevent opening prior to pressure release [3]
- 15/00 Sealings** (sealing arrangements for vehicle windows, windscreens, non-fixed roofs, doors, or similar devices B60J 10/00; sealing or packing elements for container closures B65D 53/00; sealing arrangements in rotary-piston machines or engines F01C 19/00; sealings in non-positive-displacement machines or engines F01D 11/00; arrangements of sealings in combustion engines F02F 11/00; sealing arrangements in rotary-piston pumps F04C 27/00; sealing lead-in or lead-through insulators H01B 17/30) [5]
- 15/02 • between relatively-stationary surfaces (F16J 15/46, F16J 15/48 take precedence)
- 15/04 • • without packing between the surfaces, e.g. with ground surfaces, with cutting edge
- 15/06 • • with solid packing compressed between sealing surfaces
- 15/08 • • • with exclusively metal packing
- 15/10 • • • with non-metallic packing
- 15/12 • • • • with metal reinforcement or covering
- 15/14 • • by means of granular or plastic material, or fluid
- 15/16 • between relatively-moving surfaces (F16J 15/50, F16J 15/52 take precedence; bellows pistons F16J 3/06; piston-rings or ring sealings of similar construction in general F16J 9/00; spindle sealings for valves F16K 41/00) [2]
- 15/18 • • with stuffing-boxes for elastic or plastic packings
- 15/20 • • • Packing materials therefor
- 15/22 • • • • shaped as strands, ropes, threads, ribbons, or the like
- 15/24 • • • with radially or tangentially compressed packing
- 15/26 • • with stuffing-boxes for rigid sealing rings
- 15/28 • • • with sealing rings made of metal
- 15/30 • • • with sealing rings made of carbon
- 15/32 • • with elastic sealing lip
- 15/34 • • with slip-ring pressed against a more or less radial face on one member
- 15/36 • • • connected by a diaphragm to the other member
- 15/38 • • • sealed by a packing [2]
- 15/40 • • by means of fluid
- 15/42 • • • kept in sealing position by centrifugal force
- 15/43 • • • kept in sealing position by magnetic force [6]
- 15/44 • Free-space packings
- 15/447 • • Labyrinth packings [3]
- 15/453 • • • characterised by the use of particular materials [3]
- 15/46 • with packing ring expanded or pressed into place by fluid pressure, e.g. inflatable packings (connection of valves to inflatable elastic bodies B60C 29/00; specially adapted for tube connections F16L)
- 15/48 • • influenced by the pressure within the member to be sealed
- 15/50 • between relatively-movable members, by means of a sealing without relatively-moving surfaces, e.g. fluid-tight sealings for transmitting motion through a wall
- 15/52 • • by means of sealing bellows or diaphragms (connection of valves to inflatable elastic bodies B60C 29/00)
- 15/53 • using magnetic means [6]
- 15/54 • Other sealings for rotating shafts
- 15/56 • Other sealings for reciprocating rods