

# CPC COOPERATIVE PATENT CLASSIFICATION

## F MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING (NOTE omitted)

### ENGINEERING IN GENERAL

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

## F16J PISTONS {(specially adapted for dampers [F16F 9/32](#))}; CYLINDERS; SEALINGS

### NOTE

Attention is drawn to the following places:

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

### WARNINGS

- The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:  
[F16J 15/53](#) covered by [F16J 15/43](#)
- 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.

<b>1/00</b>	<b>Pistons; Trunk pistons; Plungers (bellows pistons <a href="#">F16J 3/06</a>; piston-rings or seats therefor <a href="#">F16J 9/00</a>; {manufacture of pistons <a href="#">B23P 15/10</a>}; rotary pistons, e.g. for "Wankel" type engines <a href="#">F01C</a>; specific for combustion engines, i.e. constructed to withstand high temperature or modified for guiding, igniting, vaporising or otherwise treating the charge <a href="#">F02F</a>; {pistons for hydraulic engines <a href="#">F03C</a>}; pumps <a href="#">F04B</a>; floats <a href="#">F16K 33/00</a>)</b>	1/14	. . with connecting-rods, i.e. pivotal connections
		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
		1/22	. . . with universal joint, e.g. ball-joint
		1/24	. . designed to give the piston some rotary movement about its axis
1/001	. {One-piece pistons}	<b>3/00</b>	<b>Diaphragms; Bellows; Bellows pistons (connection of valves to inflatable elastic bodies <a href="#">B60C 29/00</a>; bellows or the like used in instruments <a href="#">G12B 1/04</a>; diaphragms for electromechanical transducers <a href="#">H04R 7/00</a>)</b>
1/003	. . {with integral sealing lips}	3/02	. Diaphragms
1/005	. {obtained by assembling several pieces}	3/04	. Bellows
1/006	. . {of different materials}	3/041	. . {Non-metallic bellows}
1/008	. . . {with sealing lips}	3/042	. . . {Fastening details}
1/01	. characterised by the use of particular materials ( <a href="#">F16J 1/02</a> takes precedence)	3/043	. . . {with particular means for limiting wear}
1/02	. Bearing surfaces	3/045	. . . {Split bellows}
1/04	. Resilient guiding parts, e.g. skirts, particularly for trunk pistons	3/046	. . . {Lubrication or venting arrangements}
1/06	. . with separate expansion members; Expansion members	3/047	. . {Metallic bellows}
1/08	. Constructional features providing for lubrication	3/048	. . {with guiding or supporting means}
1/09	. with means for guiding fluids ( <a href="#">F16J 1/08</a> takes precedence)	3/06	. Bellows pistons
1/10	. Connection to driving members	<b>7/00</b>	<b>Piston-rods</b>
1/12	. . with piston-rods, e.g. rigid connections		

<b>9/00</b>	<b>Piston-rings {, e.g. non-metallic piston-rings}, seats therefor; Ring sealings of similar construction</b> (other sealings between pistons and cylinders <a href="#">F16J 3/06</a> , <a href="#">F16J 15/16</a> {; manufacture of piston-rings <a href="#">B23P 15/06</a> , <a href="#">B23P 15/08</a> }; tools for mounting or removing piston-rings or the like <a href="#">B25B</a> ; piston sealing arrangements on brake master cylinders <a href="#">B60T 11/236</a> {; sealing provided on pump pistons <a href="#">F04B 53/143</a> })	<b>13/00</b>	<b>Covers or similar closure members for pressure vessels in general</b> (for engines or like cylinders <a href="#">F16J 10/00</a> ; sealings <a href="#">F16J 15/02</a> ; covers for box-like containers <a href="#">B65D 43/00</a> ; devices for securing or retaining closure members <a href="#">B65D 45/00</a> ; closures for containers not otherwise provided for <a href="#">B65D 51/00</a> ; manholes, covers for large containers <a href="#">B65D 90/10</a> ; gates or closures for large containers <a href="#">B65D 90/54</a> ; for vessels for containing or storing compressed, liquefied or solidified gases <a href="#">F17C 13/06</a> ; steam boilers <a href="#">F22B</a> )
9/02	• L-section rings	13/02	• Detachable closure members; Means for tightening closures ( <a href="#">F16J 13/16</a> , <a href="#">F16J 13/22</a> take precedence)
9/04	• Helical rings	13/04	• . . attached with a bridge member
9/06	• using separate springs {or elastic elements} expanding the rings; Springs therefor {; Expansion by wedging}	13/06	• . . attached only by clamps along the circumference
9/061	• . . {using metallic coiled or blade springs ( <a href="#">F16J 9/145</a> takes precedence)}	13/065	• . . . {the clamp comprising a ring encircling the flange}
9/062	• . . . {Coiled spring along the entire 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 <a href="#">E05C 9/00</a> )
9/063	• . . . {Strip or wire along the entire circumference}	13/10	• . . attached by means of a divided ring
9/064	• . . {Rings with a flat annular side rail}	13/12	• . . attached by wedging action by means of screw-thread, interrupted screw-thread, bayonet closure, or the like
9/065	• . . . {Spring expander with massive cross-section}	13/14	• . . attached exclusively by spring action or elastic action
9/066	• . . . {Spring expander from sheet metal}	13/16	• Pivoted closures ( <a href="#">F16J 13/22</a> takes precedence)
9/067	• . . . . {corrugated in the radial direction}	13/18	• . . pivoted directly on the frame
9/068	• . . . . {corrugated in the axial direction}	13/20	• . . mounted by mobile fastening on swinging arms
9/069	• . . . . {with a "C"-shaped cross section along the entire circumference}	13/22	• with movement parallel to the plane of the opening
9/08	• with expansion obtained by pressure of the medium	13/24	• with safety devices, e.g. to prevent opening prior to pressure release
9/10	• Special members for adjusting the rings	<b>15/00</b>	<b>Sealings</b>
9/12	• Details	15/002	• {comprising at least two sealings in succession ( <a href="#">F16J 15/162</a> , <a href="#">F16J 15/40</a> take precedence)}
9/14	• . Joint-closures	15/004	• . . {forming of recuperation chamber for the leaking fluid}
9/145	• . . . {of spring expanders}	15/006	• . . {with division of the pressure ( <a href="#">F16J 15/44</a> takes precedence)}
9/16	• . . . obtained by stacking of rings	15/008	• . . {with provision to put out of action at least one sealing; One sealing sealing only on standstill; Emergency or servicing sealings ( <a href="#">F16J 15/164</a> takes precedence)}
9/18	• . . . with separate bridge-elements	15/02	• between relatively-stationary surfaces ( <a href="#">F16J 15/46</a> , <a href="#">F16J 15/48</a> take precedence)
9/20	• . Rings with special cross-section (L-section rings <a href="#">F16J 9/02</a> ); Oil-scraping rings { ( <a href="#">F16J 9/06</a> takes precedence)}	15/021	• . . {with elastic packing ( <a href="#">F16J 15/08</a> takes precedence)}
9/203	• . . . {Oil-scraping rings}	15/022	• . . . {characterised by structure or material}
	<b>WARNING</b>	15/024	• . . . . {the packing being locally weakened in order to increase elasticity}
	The group <a href="#">F16J 9/203</a> is no longer used for the classification of new documents from August 1st, 2002. The backlog of this group is being continuously reclassified to <a href="#">F16J 9/206</a> , and to <a href="#">F16J 9/06</a> and sub-groups	15/025	• . . . . . {and with at least one flexible lip}
9/206	• . . . {One-piece oil-scraping rings}	15/027	• . . . . . {and with a hollow profile}
9/22	• . Rings for preventing wear of grooves or like seatings	15/028	• . . . {the packing being mechanically expanded against the sealing surface}
9/24	• . Members preventing rotation of rings in grooves	15/04	• . without packing between the surfaces, e.g. with ground surfaces, with cutting edge
9/26	• characterised by the use of particular materials	15/06	• . with solid packing compressed between sealing surfaces
9/28	• of non-metals	15/061	• . . . {with positioning means ( <a href="#">F16J 15/0831</a> takes precedence)}
<b>10/00</b>	<b>Engine or like cylinders</b> (pressure vessels in general <a href="#">F16J 12/00</a> ; cylinders for engines or other apparatus of particular kinds, see the appropriate subclasses, e.g. for combustion engines <a href="#">F02F</a> ); <b>Features of hollow, e.g. cylindrical, bodies in general</b>	15/062	• . . . {characterised by the geometry of the seat}
10/02	• Cylinders designed to receive moving pistons or plungers	15/064	• . . . {the packing combining the sealing function with other functions}
10/04	• . Running faces; Liners		
<b>12/00</b>	<b>Pressure vessels in general</b> (covers therefor <a href="#">F16J 13/00</a> ; for particular applications, see the relevant subclasses, e.g. <a href="#">B01J</a> , <a href="#">F17C</a> , <a href="#">G21C</a> )		

15/065	. . . . {fire resistant}	15/183	. . . . {using a lantern ring}
15/067	. . . {Split packings}	15/184	. . . {Tightening mechanisms}
15/068	. . . {the packing swelling under working conditions}	15/185	. . . . {with continuous adjustment of the compression of the packing}
15/08	. . . with exclusively metal packing	15/186	. . . . . {using springs}
15/0806	. . . . {characterised by material or surface treatment}	15/187	. . . {Self-aligning stuffing-boxes}
15/0812	. . . . . {with a braided or knitted body}	15/188	. . . {Split assemblies}
15/0818	. . . . . {Flat gaskets}	15/189	. . . {Means for facilitating the removal of the packing}
15/0825	. . . . . {laminated}	15/20	. . . Packing materials therefor
15/0831	. . . . . {with mounting aids}	15/22	. . . . shaped as strands, ropes, threads, ribbons, or the like
2015/0837	. . . . . {with an edge portion folded over a second plate or shim}	15/24	. . . with radially or tangentially compressed packing
2015/0843	. . . . . {with an edge portion folded over the plate itself}	15/26	. . with stuffing-boxes for rigid sealing rings
2015/085	. . . . . {without fold over}	15/28	. . . with sealing rings made of metal
2015/0856	. . . . . {with a non-metallic coating or strip}	15/30	. . . with sealing rings made of carbon
2015/0862	. . . . . {with a bore ring}	15/32	. . with elastic sealings, e.g. O-rings
2015/0868	. . . . . {Aspects not related to the edges of the gasket}	15/3204	. . . with at least one lip
2015/0875	. . . . . {comprising welds}	15/3208	. . . . provided with tension elements, e.g. elastic rings
15/0881	. . . . {the sealing effect being obtained by plastic deformation of the packing}	15/3212	. . . . . with metal springs
15/0887	. . . . {the sealing effect being obtained by elastic deformation of the packing}	15/3216	. . . . supported in a direction parallel to the surfaces
15/0893	. . . . . {the packing having a hollow profile}	15/322	. . . . supported in a direction perpendicular to the surfaces
15/10	. . . with non-metallic packing	15/3224	. . . . capable of accommodating changes in distances or misalignment between the surfaces, e.g. able to compensate for defaults of eccentricity or angular deviations
15/102	. . . . {characterised by material}	15/3228	. . . . formed by deforming a flat ring
15/104	. . . . {characterised by structure}	15/3232	. . . . having two or more lips
15/106	. . . . . {homogeneous}	15/3236	. . . . . with at least one lip for each surface, e.g. U-cup packings
15/108	. . . . {Special methods for making a non-metallic packing}	15/324	. . . Arrangements for lubrication or cooling of the sealing itself
15/12	. . . . with metal reinforcement or covering	15/3244	. . . with hydrodynamic pumping action
15/121	. . . . . {with metal reinforcement}	15/3248	. . . provided with casings or supports
15/122	. . . . . {generally parallel to the surfaces}	15/3252	. . . . with rigid casings or supports
15/123	. . . . . {Details relating to the edges of the packing}	15/3256	. . . . . comprising two casing or support elements, one attached to each surface, e.g. cartridge or cassette seals
15/125	. . . . . {generally perpendicular to the surfaces}	15/326	. . . . . with means for detecting or measuring relative rotation of the two elements
15/126	. . . . . {consisting of additions, e.g. metallic fibres, metallic powders, randomly dispersed in the packing}	15/3264	. . . . . the elements being separable from each other
15/127	. . . . . {the reinforcement being a compression stopper}	15/3268	. . . Mounting of sealing rings
15/128	. . . . . {with metal covering}	15/3272	. . . . the rings having a break or opening, e.g. to enable mounting on a shaft otherwise than from a shaft end
15/14	. . by means of granular or plastic material, or fluid	15/3276	. . . . with additional static sealing between the sealing, or its casing or support, and the surface on which it is mounted
15/16	. between relatively-moving surfaces ( <a href="#">F16J 15/50</a> , <a href="#">F16J 15/52</a> take precedence; bellows pistons <a href="#">F16J 3/06</a> ; piston-rings or ring sealings of similar construction <a href="#">F16J 9/00</a> )	15/328	. . . Manufacturing methods specially adapted for elastic sealings ( <a href="#">moulding B29C</a> )
15/162	. . {Special parts or details relating to lubrication or cooling of the sealing itself ( <a href="#">F16J 15/324</a> , <a href="#">F16J 15/3404</a> , <a href="#">F16J 15/40</a> take precedence)}	15/3284	. . . characterised by their structure; Selection of materials
15/164	. . {the sealing action depending on movements; pressure difference, temperature or presence of leaking fluid}	15/3288	. . . . Filamentary structures, e.g. brush seals
15/166	. . {with means to prevent the extrusion of the packing}	15/3292	. . . . Lamellar structures
15/168	. . {which permits material to be continuously conveyed}		
15/18	. . with stuffing-boxes for elastic or plastic packings		
15/181	. . . {for plastic packings}		
15/182	. . . {with lubricating, cooling or draining means}		

- 15/3296 . . . Arrangements for monitoring the condition or operation of elastic sealings ([F16J 15/326 takes precedence](#)); Arrangements for control of elastic sealings, e.g. of their geometry or stiffness
- 15/34 . . with slip-ring pressed against a more or less radial face on one member
- 15/3404 . . . {and characterised by parts or details relating to lubrication, cooling or venting of the seal}
- 15/3408 . . . . {at least one ring having an uneven slipping surface}
- 15/3412 . . . . . {with cavities ([F16J 15/3424 takes precedence](#))}
- 15/3416 . . . . . {with at least one continuous groove}
- 15/342 . . . . . {with means for feeding fluid directly to the face}
- 15/3424 . . . . . {with microcavities}
- 15/3428 . . . . . {with a wavy surface}
- 15/3432 . . . . . {the geometry of the surface being able to vary during operation}
- 15/3436 . . . {Pressing means}
- 15/344 . . . . {the pressing force being applied by means of an elastic ring supporting the slip-ring}
- 15/3444 . . . . {by magnetic attraction}
- 15/3448 . . . . {the pressing force resulting from fluid pressure}
- 15/3452 . . . . {the pressing force resulting from the action of a spring}
- 15/3456 . . . . {without external means for pressing the ring against the face, e.g. slip-ring with a resilient lip}
- 15/346 . . . . {the pressing force varying during operation}
- 15/3464 . . . {Mounting of the seal}
- 15/3468 . . . . {Means for controlling the deformations of the contacting faces}
- 15/3472 . . . . {Means for centering or aligning the contacting faces}
- 15/3476 . . . . {Means for minimising vibrations of the slip-ring}
- 15/348 . . . . {Pre-assembled seals, e.g. cartridge seals}
- 15/3484 . . . . . {Tandem seals}
- 15/3488 . . . . . {Split-rings}
- 15/3492 . . . {with monitoring or measuring means associated with the seal}
- 15/3496 . . . {use of special materials}
- 15/36 . . . connected by a diaphragm {or bellow} to the other member
- 15/363 . . . . {the diaphragm or bellow being made of metal}
- 15/366 . . . . . {and comprising vibration-damping means}
- 15/38 . . . sealed by a packing
- 15/40 . . by means of fluid
- 15/403 . . . {by changing the state of matter}
- 15/406 . . . {by at least one pump}
- 15/42 . . . kept in sealing position by centrifugal force
- 15/43 . . . kept in sealing position by magnetic force
- 15/44 . Free-space packings
- 15/441 . . {with floating ring}
- 15/442 . . . {segmented}
- 15/443 . . {provided with discharge channels}
- 15/444 . . {with facing materials having honeycomb-like structure}
- 15/445 . . {with means for adjusting the clearance}
- 15/447 . . Labyrinth packings
- 15/4472 . . . {with axial path}
- 15/4474 . . . . {Pre-assembled packings}
- 15/4476 . . . . {with radial path}
- 15/4478 . . . . {Pre-assembled packings}
- 15/453 . . . characterised by the use of particular materials {([F16J 15/444 takes precedence](#))}
- 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](#); {for sealing arrangements in vehicles [B60J 10/244](#); for sealing arrangements of openings in buildings [E06B 7/2318](#)}; 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](#))
- 15/525 . . . {fixed to a part of a transmission performing a wobbling or a circular translatory movement}
- 15/54 . Other sealings for rotating shafts
- 15/545 . . {submitted to unbalanced pressure in circumference; seals for oscillating actuator}
- 15/56 . Other sealings for reciprocating rods