

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:

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| 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. |

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:

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| F16J 15/53 | covered by | F16J 15/43 |
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- 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.

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| <p>1/00 Pistons; Trunk pistons; Plungers (bellows pistons F16J 3/06; piston-rings or seats therefor F16J 9/00; {manufacture of pistons B23P 15/10}; 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 for hydraulic engines F03C}; pumps F04B; floats F16K 33/00)</p> <p>1/001 . {One-piece pistons}</p> <p>1/003 . . {with integral sealing lips}</p> <p>1/005 . {obtained by assembling several pieces}</p> <p>1/006 . . {of different materials}</p> <p>1/008 . . . {with sealing lips}</p> <p>1/01 . characterised by the use of particular materials (F16J 1/02 takes precedence)</p> <p>1/02 . Bearing surfaces</p> <p>1/04 . Resilient guiding parts, e.g. skirts, particularly for trunk pistons</p> <p>1/06 . . with separate expansion members; Expansion members</p> <p>1/08 . Constructional features providing for lubrication</p> <p>1/09 . with means for guiding fluids (F16J 1/08 takes precedence)</p> <p>1/10 . Connection to driving members</p> <p>1/12 . . with piston-rods, e.g. rigid connections</p> | <p>1/14 . . with connecting-rods, i.e. pivotal connections</p> <p>1/16 . . . with gudgeon-pin; Gudgeon-pins</p> <p>1/18 Securing of gudgeon-pins</p> <p>1/20 . . . with rolling contact, other than in ball or roller bearings</p> <p>1/22 . . . with universal joint, e.g. ball-joint</p> <p>1/24 . . designed to give the piston some rotary movement about its axis</p> <p>3/00 Diaphragms; Bellows; Bellows pistons (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)</p> <p>3/02 . Diaphragms</p> <p>3/04 . Bellows</p> <p>3/041 . . {Non-metallic bellows}</p> <p>3/042 . . . {Fastening details}</p> <p>3/043 . . . {with particular means for limiting wear}</p> <p>3/045 . . . {Split bellows}</p> <p>3/046 . . . {Lubrication or venting arrangements}</p> <p>3/047 . . {Metallic bellows}</p> <p>3/048 . . {with guiding or supporting means}</p> <p>3/06 . Bellows pistons</p> <p>7/00 Piston-rods</p> |
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- 9/00** **Piston-rings {, e.g. non-metallic piston-rings}, seats therefor; Ring sealings of similar construction** (other sealings between pistons and cylinders [F16J 3/06](#), [F16J 15/16](#) {; manufacture of piston-rings [B23P 15/06](#), [B23P 15/08](#)}; tools for mounting or removing piston-rings or the like [B25B](#); piston sealing arrangements on brake master cylinders [B60T 11/236](#) {; sealing provided on pump pistons [F04B 53/143](#)})
- 9/02 . L-section rings
- 9/04 . Helical rings
- 9/06 . using separate springs {or elastic elements} expanding the rings; Springs therefor {; Expansion by wedging}
- 9/061 . . {using metallic coiled or blade springs ([F16J 9/145](#) takes precedence)}
- 9/062 . . . {Coiled spring along the entire circumference}
- 9/063 . . . {Strip or wire along the entire circumference}
- 9/064 . . {Rings with a flat annular side rail}
- 9/065 . . . {Spring expander with massive cross-section}
- 9/066 . . . {Spring expander from sheet metal}
- 9/067 {corrugated in the radial direction}
- 9/068 {corrugated in the axial direction}
- 9/069 {with a "C"-shaped cross section along the entire circumference}
- 9/08 . with expansion obtained by pressure of the medium
- 9/10 . Special members for adjusting the rings
- 9/12 . Details
- 9/14 . . Joint-closures
- 9/145 . . . {of spring expanders}
- 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 {([F16J 9/06](#) takes precedence)}
- 9/203 . . . {Oil-scraping rings}
- WARNING**
- The group [F16J 9/203](#) is no longer used for the classification of new documents from August 1st, 2002. The backlog of this group is being continuously reclassified to [F16J 9/206](#), and to [F16J 9/06](#) and sub-groups
- 9/206 . . . {One-piece 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
- 9/28 . of non-metals
- 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**
- 10/02 . Cylinders designed to receive moving pistons or plungers
- 10/04 . . Running faces; Liners
- 12/00** **Pressure vessels in general (covers therefor [F16J 13/00](#); for particular applications, see the relevant subclasses, e.g. [B01J](#), [F17C](#), [G21C](#))**
- 13/00** **Covers or similar closure members for pressure vessels in general (for engines 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)
- 13/04 . . attached with a bridge member
- 13/06 . . attached only by clamps along the circumference
- 13/065 . . . {the clamp comprising a ring encircling the flange}
- 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)
- 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
- 13/24 . with safety devices, e.g. to prevent opening prior to pressure release
- 15/00** **Sealings**
- 15/002 . {comprising at least two sealings in succession ([F16J 15/162](#), [F16J 15/40](#) take precedence)}
- 15/004 . . {forming of recuperation chamber for the leaking fluid}
- 15/006 . . {with division of the pressure ([F16J 15/44](#) takes precedence)}
- 15/008 . . {with provision to put out of action at least one sealing; One sealing sealing only on standstill; Emergency or servicing sealings ([F16J 15/164](#) takes precedence)}
- 15/02 . between relatively-stationary surfaces ([F16J 15/46](#), [F16J 15/48](#) take precedence)
- 15/021 . . {with elastic packing ([F16J 15/08](#) takes precedence)}
- 15/022 . . . {characterised by structure or material}
- 15/024 {the packing being locally weakened in order to increase elasticity}
- 15/025 {and with at least one flexible lip}
- 15/027 {and with a hollow profile}
- 15/028 . . . {the packing being mechanically expanded against the sealing surface}
- 15/04 . . without packing between the surfaces, e.g. with ground surfaces, with cutting edge
- 15/06 . . with solid packing compressed between sealing surfaces
- 15/061 . . . {with positioning means ([F16J 15/0831](#) takes precedence)}
- 15/062 . . . {characterised by the geometry of the seat}
- 15/064 . . . {the packing combining the sealing function with other functions}

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

- 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