

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:
[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.

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| 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) | 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} | 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) |
| 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 (F16J 1/02 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 (F16J 1/08 takes precedence) | 3/06 | . Bellows pistons |
| 1/10 | . Connection to driving members | 7/00 | Piston-rods |
| 1/12 | . . with piston-rods, e.g. rigid connections | | |

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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 }) | 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) |
| 9/02 | • L-section rings | 13/02 | • Detachable closure members; Means for tightening closures (F16J 13/16 , F16J 13/22 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 (F16J 9/145 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 E05C 9/00) |
| 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 (F16J 13/22 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 | 15/00 | Sealings |
| 9/12 | • Details | 15/002 | • {comprising at least two sealings in succession (F16J 15/162 , F16J 15/40 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 (F16J 15/44 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 (F16J 15/164 takes precedence)} |
| 9/18 | • . . with separate bridge-elements | 15/02 | • between relatively-stationary surfaces (F16J 15/46 , F16J 15/48 take precedence) |
| 9/20 | • . Rings with special cross-section (L-section rings F16J 9/02); Oil-scraping rings { (F16J 9/06 takes precedence)} | 15/021 | • . . {with elastic packing (F16J 15/08 takes precedence)} |
| 9/203 | • . . {Oil-scraping rings} | 15/022 | • . . . {characterised by structure or material} |
| | WARNING | 15/024 | • . . . {the packing being locally weakened in order to increase elasticity} |
| | 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 | 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 (F16J 15/0831 takes precedence)} |
| 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 | 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 | | |
| 12/00 | Pressure vessels in general (covers therefor F16J 13/00 ; for particular applications, see the relevant subclasses, e.g. B01J , F17C , G21C) | | |

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| 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 (F16J 15/50 , F16J 15/52 take precedence; bellows pistons F16J 3/06 ; piston-rings or ring sealings of similar construction F16J 9/00) | 15/328 | . . . Manufacturing methods specially adapted for elastic sealings (moulding B29C) |
| 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)} | 15/3284 | . . . 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