

# 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.             |

##### WARNING

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](#)

- |             |   |             |  |
|-------------|---|-------------|--|
| <b>1/00</b> | <b>Pistons; Trunk pistons; Plungers</b> (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> ) | 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  |
|             |   | <b>3/00</b> | <b>Diaphragms; Bellows; Bellows pistons</b> (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> ) |
|             |   | 3/02        | . Diaphragms   |
|             |   | 3/04        | . Bellows  |
|             |   | 3/041       | . . {Non-metallic bellows}   |
|             |   | 3/042       | . . . {Fastening details}  |
|             |   | 3/043       | . . . {with particular means for limiting wear}  |
|             |   | 3/045       | . . . {Split bellows}  |
|             |   | 3/046       | . . . {Lubrication or venting arrangements}  |
|             |   | 3/047       | . . {Metallic bellows}   |
|             |   | 3/048       | . . {with guiding or supporting means}   |
|             |   | 3/06        | . Bellows pistons  |
|             |   | <b>7/00</b> | <b>Piston-rods</b>   |
| 1/001       | . {One-piece pistons}   |             |  |
| 1/003       | . . {with integral sealing lips}  |             |  |
| 1/005       | . {obtained by assembling several pieces}   |             |  |
| 1/006       | . . {of different materials}  |             |  |
| 1/008       | . . . {with sealing lips}   |             |  |
| 1/01        | . characterised by the use of particular materials ( <a href="#">F16J 1/02</a> takes precedence)  |             |  |
| 1/02        | . Bearing surfaces  |             |  |
| 1/04        | . Resilient guiding parts, e.g. skirts, particularly for trunk pistons  |             |  |
| 1/06        | . . with separate expansion members; Expansion members  |             |  |
| 1/08        | . Constructional features providing for lubrication   |             |  |
| 1/09        | . with means for guiding fluids ( <a href="#">F16J 1/08</a> takes precedence)   |             |  |
| 1/10        | . Connection to driving members   |             |  |
| 1/12        | . . with piston-rods, e.g. rigid connections  |             |  |
| 1/14        | . . with connecting-rods, i.e. pivotal connections  |             |  |
| 1/16        | . . . with gudgeon-pin; Gudgeon-pins  |             |  |

- 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 or 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