

**CPC****COOPERATIVE PATENT CLASSIFICATION****F16J****PISTONS** {(specially adapted for dampers [F16F 9/32](#)); **CYLINDERS**;  
**SEALINGS****NOTE**

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.

**WARNING**

The following IPC groups are not used in the CPC scheme. Subject matter covered by these groups is classified in the following CPC groups:

[F16J 15/53](#) covered by [F16J 15/43](#)

**F16J 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](#))

F16J 1/001

. { One-piece pistons }

F16J 1/003

.. { with integral sealing lips }

F16J 1/005

. { obtained by assembling several pieces }

F16J 1/006

.. { of different materials }

F16J 1/008

... { with sealing lips }

F16J 1/01

. characterised by the use of particular materials ([F16J 1/02](#) takes precedence)

F16J 1/02

. Bearing surfaces

F16J 1/04

. Resilient guiding parts, e.g. skirts, particularly for trunk pistons

- F16J 1/06 . . with separate expansion members; Expansion members
- F16J 1/08 . Constructional features providing for lubrication
- F16J 1/09 . with means for guiding fluids ([F16J 1/08](#) takes precedence)
- F16J 1/10 . Connection to driving members
- F16J 1/12 . . with piston-rods, e.g. rigid connections
- F16J 1/14 . . with connecting-rods, i.e. pivotal connections
- F16J 1/16 . . . with gudgeon-pin; Gudgeon-pins
- F16J 1/18 . . . . Securing of gudgeon-pins
- F16J 1/20 . . . with rolling contact, other than in ball or roller bearings
- F16J 1/22 . . . with universal joint, e.g. ball-joint
- F16J 1/24 . . designed to give the piston some rotary movement about its axis

**F16J 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](#))

- F16J 3/02 . Diaphragms
- F16J 3/04 . Bellows
- F16J 3/041 . . { Non-metallic bellows }
- F16J 3/042 . . . { Fastening details }
- F16J 3/043 . . . { with particular means for limiting wear }
- F16J 3/045 . . . { Split bellows }
- F16J 3/046 . . . { Lubrication or venting arrangements }
- F16J 3/047 . . { Metallic bellows }
- F16J 3/048 . . [with guiding or supporting means]
- F16J 3/06 . Bellows pistons

**F16J 7/00** **Piston-rods**

**F16J 9/00** **Piston-rings, { e.g. non-metallic piston-rings }, seats therefor; Ring sealings of similar construction in general** (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](#) })

- F16J 9/02 . L-section rings
- F16J 9/04 . Helical rings

- F16J 9/06 . using separate springs { or elastic elements } expanding the rings; Springs therefor; { Expansion by wedging }
- F16J 9/061 .. { using metallic coiled or blade springs (F16J 9/145 takes precedence)}
- F16J 9/062 ... { Coiled spring along the entire circumference }
- F16J 9/063 ... { Strip or wire along the entire circumference }
- F16J 9/064 .. { Rings with a flat annular side rail }
- F16J 9/065 ... { Spring expander with massive cross-section }
- F16J 9/066 ... { Spring expander from sheet metal }
- F16J 9/067 .... { corrugated in the radial direction }
- F16J 9/068 .... { corrugated in the axial direction }
- F16J 9/069 .... { with a "C"-shaped cross section along the entire circumference }

F16J 9/08 . with expansion obtained by pressure of the medium

F16J 9/10 . Special members for adjusting the rings

F16J 9/12 . Details

F16J 9/14 .. Joint-closures

F16J 9/145 ... { of spring expanders }

F16J 9/16 ... obtained by stacking of rings

F16J 9/18 ... with separate bridge-elements

F16J 9/20 .. Rings with special cross-section (L-section rings F16J 9/02); Oil-scraping rings {(F16J 9/06 takes precedence)}

F16J 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

F16J 9/206 ... { One-piece oil-scraping rings }

F16J 9/22 .. Rings for preventing wear of grooves or like seatings

F16J 9/24 .. Members preventing rotation of rings in grooves

F16J 9/26 . characterised by the use of particular materials

F16J 9/28 . of non-metals

**F16J 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**

F16J 10/02 . Cylinders designed to receive moving pistons or plungers

F16J 10/04 .. Running faces; Liners

- F16J 12/00**      **Pressure vessels in general** (covers therefor [F16J 13/00](#); for particular applications, see the relevant subclasses, e.g. [B01J](#), [F17C](#), [G21C](#))
- F16J 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](#))
- [F16J 13/02](#)      .    Detachable closure members; Means for tightening closures ([F16J 13/16](#), [F16J 13/22](#) take precedence)
- [F16J 13/04](#)      . .    attached with a bridge member
- [F16J 13/06](#)      . .    attached only by clamps along the circumference
- [F16J 13/065](#)      . . .    { the clamp comprising a ring encircling the flange }
- [F16J 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](#))
- [F16J 13/10](#)      . .    attached by means of a divided ring
- [F16J 13/12](#)      . .    attached by wedging action by means of screw-thread, interrupted screw-thread, bayonet closure, or the like
- [F16J 13/14](#)      . .    attached exclusively by spring action or elastic action
- [F16J 13/16](#)      .    Pivoted closures ([F16J 13/22](#) takes precedence)
- [F16J 13/18](#)      . .    pivoted directly on the frame
- [F16J 13/20](#)      . .    mounted by mobile fastening on swinging arms
- [F16J 13/22](#)      .    with movement parallel to the plane of the opening
- [F16J 13/24](#)      .    with safety devices, e.g. to prevent opening prior to pressure release
- F16J 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](#))
- [F16J 15/002](#)      .    { comprising at least two sealings in succession ([F16J 15/162](#), [F16J 15/40](#) take precedence)}
- [F16J 15/004](#)      . .    { forming or recuperation chamber for the leaking fluid }
- [F16J 15/006](#)      . .    { with division of the pressure ([F16J 15/44](#) takes precedence)}
- [F16J 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)}
- [F16J 15/02](#)      .    between relatively-stationary surfaces ([F16J 15/46](#), [F16J 15/48](#) take precedence)

F16J 15/021	..	{ with elastic packing ( <a href="#">F16J 15/08</a> takes precedence)}
F16J 15/022	...	{ characterised by structure or material }
F16J 15/024	....	{ the packing being locally weakened in order to increase elasticity }
F16J 15/025	.....	{ and with at least one flexible lip }
F16J 15/027	.....	{ and with a hollow profile }
F16J 15/028	...	{ the packing being mechanically expanded against the sealing surface }
F16J 15/04	..	without packing between the surfaces, e.g. with ground surfaces, with cutting edge
F16J 15/06	..	with solid packing compressed between sealing surfaces
F16J 15/061	...	{ with positioning means ( <a href="#">F16J 15/0831</a> takes precedence)}
F16J 15/062	...	{ characterised by the geometry of the seat }
F16J 15/064	...	{ the packing combining the sealing function with other functions }
F16J 15/065	....	{ fire resistant }
F16J 15/067	...	{ Split packings }
F16J 15/068	...	{ the packing swelling under working conditions }
F16J 15/08	...	with exclusively metal packing
F16J 15/0806	....	{ characterised by material or surface treatment }
F16J 15/0812	.....	{ with a braided or knitted body }
F16J 15/0818	....	{ Flat gaskets }
F16J 15/0825	.....	{ laminated }
F16J 15/0831	.....	{ with mounting aids }
F16J 15/0837	.....	{ with an edge portion folded over a second plate or shim }
F16J 15/0843	.....	{ with an edge portion folded over the plate itself }
F16J 15/085	.....	{ without fold over }
F16J 15/0856	.....	{ with a non-metallic coating or strip }
F16J 15/0862	.....	{ with a bore ring }
F16J 15/0868	.....	{ Aspects not related to the edges of the gasket }
F16J 15/0875	.....	{ comprising welds }
F16J 15/0881	....	{ the sealing effect being obtained by plastic deformation of the packing }
F16J 15/0887	....	{ the sealing effect being obtained by elastic deformation of the packing }
F16J 15/0893	.....	{ the packing having a hollow profile }
F16J 15/10	...	with non-metallic packing
F16J 15/102	....	{ characterised by material }
F16J 15/104	....	{ characterised by structure }
F16J 15/106	.....	{ homogeneous }
F16J 15/108	....	{ Special methods for making a non-metallic packing }
F16J 15/12	....	with metal reinforcement or covering
F16J 15/121	.....	{ with metal reinforcement }
F16J 15/122	.....	{ generally parallel to the surfaces }
F16J 15/123	.....	{ Details relating to the edges of the packing }
F16J 15/125	.....	{ generally perpendicular to the surfaces }

F16J 15/126	.....	{ consisting of additions, e.g. metallic fibres, metallic powders, randomly dispersed in the packing }
F16J 15/127	.....	{ the reinforcement being a compression stopper }
F16J 15/128	.....	{ with metal covering }
F16J 15/14	..	by means of granular or plastic material, or fluid
F16J 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 sealing of similar construction in general <a href="#">F16J 9/00</a> ; spindle sealings for valves <a href="#">F16K 41/00</a> )
F16J 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)}
F16J 15/164	..	{ the sealing action depending on movements; pressure difference, temperature or presence of leaking fluid }
F16J 15/166	..	{ with means to prevent the extrusion of the packing }
F16J 15/168	..	{ which permits material to be continuously conveyed }
F16J 15/18	..	with stuffing-boxes for elastic or plastic packings
F16J 15/181	...	{ for plastic packings }
F16J 15/182	...	{ with lubricating, cooling or draining means }
F16J 15/183	....	{ using a lantern ring }
F16J 15/184	...	{ Tightening mechanisms }
F16J 15/185	....	{ with continuous adjustment of the compression of the packing }
F16J 15/186	.....	{ using springs }
F16J 15/187	...	{ Self-aligning stuffing-boxes }
F16J 15/188	...	{ Split assemblies }
F16J 15/189	...	{ Means for facilitating the removal of the packing }
F16J 15/20	...	Packing materials therefor
F16J 15/22	....	shaped as strands, ropes, threads, ribbons, or the like
F16J 15/24	...	with radially or tangentially compressed packing
F16J 15/26	..	with stuffing-boxes for rigid sealing rings
F16J 15/28	...	with sealing rings made of metal
F16J 15/30	...	with sealing rings made of carbon
F16J 15/32	..	with elastic sealing lip { with elastic sealing, e.g. "O" ring; <a href="#">F16J 15/34</a> takes precedence }
F16J 15/3204	...	{ with at least one lip }
F16J 15/3208	....	{ provided with a spring-tension element }
F16J 15/3212	.....	{ with a metal spring }
F16J 15/3216	....	{ supported in a direction parallel to the surfaces }
F16J 15/322	....	{ supported in a direction perpendicularly to the surfaces }
F16J 15/3224	....	{ protected against changes in distances between the surfaces }
F16J 15/3228	....	{ formed by deforming a flat annular ring }
F16J 15/3232	....	{ with a plurality of lips ( <a href="#">F16J 15/3208</a> to <a href="#">F16J 15/3228</a> take precedence)}
F16J 15/3236	.....	{ with at least one lip for each surface, i.e. "U" cup packings }

F16J 15/324	...	{ Details relating to lubrication or cooling of the sealing itself (in general <a href="#">F16J 15/162</a> ) }
F16J 15/3244	...	{ with hydro-dynamic pumping action }
F16J 15/3248	...	{ provided with a casing }
F16J 15/3252	....	{ with a rigid casing }
F16J 15/3256	.....	{ comprising two elements fixed respectively on each surface }
F16J 15/326	.....	{ with means for detecting the relative rotation of the two elements }
F16J 15/3264	.....	{ the elements being separable }
F16J 15/3268	....	{ Mounting of sealing lips }
F16J 15/3272	.....	{ The sealing having a break, e.g. permitting the radial mounting around a shaft }
F16J 15/3276	....	{ Static sealing round the fixation on one of the surfaces }
F16J 15/328	...	{ Special methods for making elastic sealings (moulding or like operations, see the relevant classes) }
F16J 15/3284	...	{ Structural composition; Use of special materials }
F16J 15/3288	....	{ Filamentary structures, e.g. brush seal }
F16J 15/3292	....	{ Lamellar structures }
F16J 15/3296	...	{ Measuring or controlling equipment specially adapted for elastic sealings (measuring in general <a href="#">G01</a> ; Controlling in general <a href="#">G05</a> ) }
F16J 15/34	..	with slip-ring pressed against a more or less radial face on one member
F16J 15/3404	...	{ and characterised by parts or details relating to lubrication, cooling or venting of the seal }
F16J 15/3408	....	{ at least one ring having an uneven slipping surface }
F16J 15/3412	.....	{ with cavities ( <a href="#">F16J 15/3424</a> takes precedence) }
F16J 15/3416	.....	{ with at least one continuous groove }
F16J 15/342	.....	{ with means for feeding fluid directly to the face }
F16J 15/3424	.....	{ with micro-cavities }
F16J 15/3428	.....	{ with a wavy surface }
F16J 15/3432	.....	{ the geometry of the surface being able to vary during operation }
F16J 15/3436	...	{ Pressing means }
F16J 15/344	....	{ the pressing force being applied by means of an elastic ring supporting the slip-ring }
F16J 15/3444	....	{ by magnetic attraction }
F16J 15/3448	....	{ the pressing force resulting from fluid pressure }
F16J 15/3452	....	{ the pressing force resulting from the action of a spring }
F16J 15/3456	....	{ without external means for pressing the ring against the face, e.g. slip-ring with a resilient lip }
F16J 15/346	....	{ the pressing force varying during operation }
F16J 15/3464	...	{ Mounting of the seal }
F16J 15/3468	....	{ Means for controlling the deformations of the contacting faces }
F16J 15/3472	....	{ Means for centering or aligning the contacting faces }
F16J 15/3476	....	{ Means for minimising vibrations of the slip-ring }

- F16J 15/348 . . . . { Pre-assembled seals, e.g. cartridge seals }
- F16J 15/3484 . . . . . { Tandem seals }
- F16J 15/3488 . . . . { Split-rings }
- F16J 15/3492 . . . { with monitoring or measuring means associated with the seal }
- F16J 15/3496 . . . { use of special materials }
- F16J 15/36 . . . connected by a diaphragm { or bellow } to the other member
- F16J 15/363 . . . . { the diaphragm or bellow being made of metal }
- F16J 15/366 . . . . . { and comprising vibration-damping means }
- F16J 15/38 . . . sealed by a packing
- F16J 15/40 . . by means of fluid
- F16J 15/403 . . . { by changing the state of matter }
- F16J 15/406 . . . { by at least one pump }
- F16J 15/42 . . . kept in sealing position by centrifugal force
- F16J 15/43 . . . kept in sealing position by magnetic force
  
- F16J 15/44 . Free-space packings
- F16J 15/441 . . { with floating ring }
- F16J 15/442 . . . { segmented }
- F16J 15/443 . . { provided with discharge channels }
- F16J 15/444 . . { with facing materials having honeycomb-like structure }
- F16J 15/445 . . { with means for adjusting the clearance }
- F16J 15/447 . . Labyrinth packings
- F16J 15/4472 . . . { with axial path }
- F16J 15/4474 . . . . { Pre-assembled packings }
- F16J 15/4476 . . . { with radial path }
- F16J 15/4478 . . . . { Pre-assembled packings }
- F16J 15/453 . . . characterised by the use of particular materials {(F16J 15/444 takes precedence)}
  
- F16J 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 10/0037; for sealing arrangements of openings in buildings E06B 7/2318 }; for tube connections F16L)
- F16J 15/48 . . influenced by the pressure within the member to be sealed
  
- F16J 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
- F16J 15/52 . . by means of sealing bellows or diaphragms (connection of valves to inflatable elastic bodies B60C 29/00)
- F16J 15/525 . . . { fixed to a part of a transmission performing a wobbling or a circular translatory movement }
  
- F16J 15/54 . Other sealings for rotating shafts
- F16J 15/545 . . { submitted to unbalanced pressure in circumference; seals for oscillating actuator }



F16J 15/56

- . Other sealings for reciprocating rods