

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 (F16J 15/08 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 (F16J 15/0831 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 2015/0837	.....	{with an edge portion folded over a second plate or shim }
F16J 2015/0843	.....	{with an edge portion folded over the plate itself }
F16J 2015/085	.....	{without fold over }
F16J 2015/0856	.....	{with a non-metallic coating or strip }
F16J 2015/0862	.....	{with a bore ring }
F16J 2015/0868	.....	{Aspects not related to the edges of the gasket }
F16J 2015/0875	.....	{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 (F16J 15/50 , F16J 15/52 take precedence; bellows pistons F16J 3/06 ; piston-rings or ring sealing of similar construction in general F16J 9/00 ; spindle sealings for valves F16K 41/00)
F16J 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)}
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; F16J 15/34 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 (F16J 15/3208 to F16J 15/3228 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 F16J 15/162)}
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 G01 ; Controlling in general G05)}
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 (F16J 15/3424 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