

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