

# CPC COOPERATIVE PATENT CLASSIFICATION

**F02F** **CYLINDERS, PISTONS OR CASINGS, FOR COMBUSTION ENGINES; ARRANGEMENTS OF SEALINGS IN COMBUSTION ENGINES** (specially adapted for rotary-piston or oscillating-piston internal-combustion engines [F02B](#); specially adapted for gas-turbine plants [F02C](#); specially adapted for jet-propulsion plants [F02K](#))

## NOTES

1. Attention is drawn to the notes preceding class [F01](#).
2. In considering the relationship between class [F16](#) and subclass [F02F](#), class [F16](#) will take precedence unless the subject-matter is specific to combustion engines.

<b>1/00</b>	<b>Cylinders; Cylinder heads (in general <a href="#">F16J</a>)</b>	<b>2001/245</b>	. . . {the valve stems being orientated at an angle with the cylinder axis}
1/002	. {Integrally formed cylinders and cylinder heads}	<b>2001/246</b>	. . . . {and orientated radially from the combustion chamber surface}
1/004	. {Cylinder liners ( <a href="#">F02F 1/08</a> , <a href="#">F02F 1/16</a> take precedence)}	<b>2001/247</b>	. . . {the valve stems being orientated in parallel with the cylinder axis}
<b>2001/006</b>	. {having a ring at the inside of a liner or cylinder for preventing the deposit of carbon oil particles, e.g. oil scrapers}	<b>2001/248</b>	. . {Methods for avoiding thermal stress-induced cracks in the zone between valve seat openings}
<b>2001/008</b>	. {Stress problems, especially related to thermal stress}	<b>2001/249</b>	. . {with flame plate, e.g. insert in the cylinder head used as a thermal insulation between cylinder head and combustion chamber}
1/02	. having cooling means ( <a href="#">cylinder heads F02F 1/26</a> )	1/26	. . having cooling means
1/04	. . for air cooling	1/28	. . . for air cooling
1/045	. . . {Attachment of cylinders to crankcase}	1/30	. . . . Finned cylinder heads
1/06	. . . Shape or arrangement of cooling fins; Finned cylinders	1/305	. . . . . {the cylinder heads being of side valve type}
1/065	. . . . {with means for directing or distributing cooling medium}	1/32	. . . . . the cylinder heads being of overhead valve type
1/08	. . . . running-liner and cooling-part of cylinder being different parts or of different material	1/34	. . . . . with means for directing or distributing cooling medium ( <a href="#">F02F 1/32</a> takes precedence)
1/10	. . for liquid cooling	1/36	. . . for liquid cooling
1/102	. . . {Attachment of cylinders to crankcase}	1/365	. . . . {the cylinder heads being of side valve type}
<b>2001/104</b>	. . . {using an open deck, i.e. the water jacket is open at the block top face}	1/38	. . . . the cylinder heads being of overhead valve type
<b>2001/106</b>	. . . {using a closed deck, i.e. the water jacket is not open at the block top face}	1/40	. . . . . Cylinder heads with means for directing, guiding, or distributing liquid stream ( <a href="#">F02F 1/38</a> takes precedence)
1/108	. . . {Siamese-type cylinders, i.e. cylinders cast together}	1/42	. . Shape or arrangement of intake or exhaust channels in cylinder heads
1/12	. . . Preventing corrosion of liquid-swept surfaces	<b>2001/4207</b>	. . . {Arrangements with one conduit connected with two valves; Arrangements connecting one valve with two conduits}
1/14	. . . Cylinders with means for directing, guiding or distributing liquid stream	1/4214	. . . {specially adapted for four or more valves per cylinder}
1/16	. . . Cylinder liners of wet type	1/4221	. . . . {particularly for three or more inlet valves (mechanisms for driving such valves <a href="#">F01L 1/265</a> )}
1/163	. . . . {the liner being midsupported}	1/4228	. . . {Helically-shaped channels ( <a href="#">F02B 31/00</a> takes precedence)}
1/166	. . . . {Spacer decks}	1/4235	. . . {of intake channels}
1/18	. Other cylinders	1/4242	. . . . {with a partition wall inside the channel}
1/183	. . {Oval or square cylinders}	1/425	. . . . {with a separate deviation element inside the channel}
1/186	. . {for use in engines with two or more pistons reciprocating within same cylinder (such engines per se <a href="#">F02B 75/28</a> )}	1/4257	. . . . . {with an intake liner}
1/20	. . characterised by constructional features providing for lubrication	1/4264	. . . . {of exhaust channels}
1/22	. . characterised by having ports in cylinder wall for scavenging or charging	1/4271	. . . . . {with an exhaust liner}
1/24	. Cylinder heads	<b>2001/4278</b>	. . . . . {Exhaust collectors}
<b>2001/241</b>	. . {specially adapted to pent roof shape of the combustion chamber}	1/4285	. . . {of both intake and exhaust channel}
1/242	. . {Arrangement of spark plugs or injectors}		
1/243	. . {Cylinder heads and inlet or exhaust manifolds integrally cast together}		
<b>2001/244</b>	. . {Arrangement of valve stems in cylinder heads}		

1/4292	. . . . {with liners ( <a href="#">F02F 1/4257</a> , <a href="#">F02F 1/4271</a> take precedence)}	7/0004	. . {Crankcases of one-cylinder engines}
<b>3/00</b>	<b>Pistons (in general <a href="#">F16J</a>)</b>	7/0007	. . {Crankcases of engines with cylinders in line}
2003/0007	. {Monolithic pistons; One piece constructions; Casting of pistons}	7/0009	. . {Crankcases of opposed piston engines}
3/0015	. {Multi-part pistons}	7/0012	. . {Crankcases of V-engines}
3/0023	. . {the parts being bolted or screwed together}	7/0014	. . {Crankcases of W-, delidic, or quadratic engines, or the like}
3/003	. . {the parts being connected by casting, brazing, welding or clamping}	7/0017	. . {Crankcases of radial engines}
2003/0038	. . . {by brazing}	7/0019	. . {Cylinders and crankshaft not in one plane (deaxation)}
2003/0046	. . . {by crimping}	7/0021	. {Construction}
2003/0053	. . . {by soldering}	7/0024	. . {Casings for larger engines}
2003/0061	. . . {by welding}	7/0026	. . . {Casings for horizontal engines}
3/0069	. . {the crown and skirt being interconnected by the gudgeon pin}	7/0029	. . {Space-frames}
3/0076	. {the inside of the pistons being provided with ribs or fins}	7/0031	. . {Construction kit principle (modular engines)}
3/0084	. {the pistons being constructed from specific materials}	7/0034	. . {Built from sheet material and welded casings}
3/0092	. . {the material being steel-plate}	7/0036	. . {Casings for two-stroke engines with scavenging conduits}
3/02	. having means for accomodating or controlling heat expansion	7/0039	. . {Casings for small engines, especially with crankcase pumps}
3/022	. . {the pistons having an oval circumference or non-cylindrical shaped skirts, e.g. oval ( <a href="#">F02F 3/025</a> , <a href="#">F02F 3/027</a> take precedence)}	2007/0041	. . {Fixing Bolts}
3/025	. . {having circumferentially slotted piston skirts, e.g. T-slots}	7/0043	. {Arrangements of mechanical drive elements}
3/027	. . {the skirt wall having cavities}	7/0046	. . {Shape of casings adapted to facilitate fitting or dismantling of engine parts}
3/04	. . having expansion-controlling inserts	7/0048	. . {Tunnel-type frames}
3/042	. . . {the inserts consisting of reinforcements in the skirt interconnecting separate wall parts, e.g. rods or strips}	7/0051	. . {Crankcase pump engines}
3/045	. . . {the inserts being located in the crown}	7/0053	. . {Crankshaft bearings fitted in the crankcase}
3/047	. . . {the inserts being located around the gudgeon pin bearings}	2007/0056	. . . {using bearing beams, i.e. bearings interconnected by a beam or multiple beams}
3/06	. . . the inserts having bimetallic effect	7/0058	. . {Longitudinally or transversely separable crankcases}
3/08	. . . the inserts being ring-shaped	7/006	. {Camshaft or pushrod housings ( <a href="#">oil sumps</a> <a href="#">F01M 11/0004</a> )}
3/10	. having surface coverings ( <a href="#">F02F 3/02</a> takes precedence)	2007/0063	. . {Head bolts; Arrangements of cylinder head bolts}
3/105	. . {the coverings forming a double skirt}	7/0065	. {Shape of casings for other machine parts and purposes, e.g. utilisation purposes, safety}
3/12	. . on piston heads	7/0068	. . {Adaptations for other accessories}
3/14	. . . within combustion chambers	7/007	. . {Adaptations for cooling}
3/16	. having cooling means	7/0073	. . {Adaptations for fitting the engine, e.g. front-plates or bell-housings}
3/18	. . the means being a liquid or solid coolant, e.g. sodium, in a closed chamber in piston	2007/0075	. . . {Front covers}
3/20	. . the means being a fluid flowing through or along piston	2007/0078	. . . {Covers for belt transmissions}
3/22	. . . the fluid being liquid	7/008	. . {Sound insulation ( <a href="#">see also</a> <a href="#">F02B 77/13</a> )}
3/225	. . . . {the liquid being directed into blind holes}	7/0082	. {Mounting of engine casings}
3/24	. having means for guiding gases in cylinders, e.g. for guiding scavenging charge in two-stroke engines	7/0085	. {Materials for constructing engines or their parts}
3/26	. having combustion chamber in piston head ( <a href="#">the surface thereof being covered</a> <a href="#">F02F 3/14</a> )	7/0087	. . {Ceramic materials}
3/28	. Other pistons with specially-shaped head	2007/009	. . {Hypereutectic aluminum, e.g. aluminum alloys with high SI content}
3/285	. . {the head being provided with an insert located in or on the combustion-gas-swept surface}	2007/0092	. . {Transparent materials}
<b>5/00</b>	<b>Piston rings, e.g. associated with piston crown {(not used <a href="#">see</a> <a href="#">F16J 9/00</a>)}</b>	7/0095	. {Constructing engine casings ( <a href="#">welded casings</a> <a href="#">F02F 7/0034</a> )}
<b>7/00</b>	<b>Casings, e.g. crankcases (engine casings in general <a href="#">F16M</a>) {or frames}</b>	2007/0097	. {for large diesel engines}
7/0002	. {Cylinder arrangements}	<b>11/00</b>	<b>Arrangements of sealings in combustion engines (piston rings <a href="#">F02F 5/00</a> {not used, <a href="#">see</a> <a href="#">F16J 9/00</a>}; sealings per se <a href="#">F16J</a>)</b>
		11/002	. {involving cylinder heads}
		11/005	. {involving cylinder liners}
		11/007	. {involving rotary applications}
		<b>2200/00</b>	<b>Manufacturing</b>
		2200/02	. Riveting
		2200/04	. Forging of engine parts

## F02F

- 2200/06 . Casting ([casting of pistons F02F 2003/0007](#))
  - 2200/08 . . using a lost model, e.g. foam casting
  - 2200/11 . using wrought materials, e.g. wrought steels
- 2547/00**