

CPC COOPERATIVE PATENT CLASSIFICATION

F MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING (NOTE omitted)

ENGINES OR PUMPS

F02 COMBUSTION ENGINES (cyclically operating valves therefor, lubricating, exhausting, or silencing engines [F01](#)); HOT-GAS OR COMBUSTION-PRODUCT ENGINE PLANTS

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.

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

- 2001/4207 . . . {Arrangements with one conduit connected with two valves; Arrangements connecting one valve with two conduits}
- 1/4214 . . . {specially adapted for four or more valves per cylinder}
- 1/4221 {particularly for three or more inlet valves (mechanisms for driving such valves [F01L 1/265](#))}
- 1/4228 . . . {Helicelly-shaped channels ([F02B 31/00](#) takes precedence)}
- 1/4235 . . . {of intake channels}
- 1/4242 {with a partition wall inside the channel}
- 1/425 {with a separate deviation element inside the channel}
- 1/4257 {with an intake liner}
- 1/4264 . . . {of exhaust channels}
- 1/4271 {with an exhaust liner}
- 2001/4278 {Exhaust collectors}
- 1/4285 . . . {of both intake and exhaust channel}
- 1/4292 {with liners ([F02F 1/4257](#), [F02F 1/4271](#) take precedence)}
- 3/00 Pistons (in general [F16J](#))**
- 2003/0007 . {Monolithic pistons; One piece constructions; Casting of pistons}
- 3/0015 . {Multi-part pistons}
- 3/0023 . . {the parts being bolted or screwed together}
- 3/003 . . {the parts being connected by casting, brazing, welding or clamping}
- 2003/0038 . . . {by brazing}
- 2003/0046 . . . {by crimping}
- 2003/0053 . . . {by soldering}
- 2003/0061 . . . {by welding}
- 3/0069 . . {the crown and skirt being interconnected by the gudgeon pin}
- 3/0076 . {the inside of the pistons being provided with ribs or fins}
- 3/0084 . {the pistons being constructed from specific materials}
- 3/0092 . . {the material being steel-plate}
- 3/02 . having means for accommodating or controlling heat expansion
- 3/022 . . {the pistons having an oval circumference or non-cylindrical shaped skirts, e.g. oval ([F02F 3/025](#), [F02F 3/027](#) take precedence)}
- 3/025 . . {having circumferentially slotted piston skirts, e.g. T-slots}
- 3/027 . . {the skirt wall having cavities}
- 3/04 . . having expansion-controlling inserts
- 3/042 . . . {the inserts consisting of reinforcements in the skirt interconnecting separate wall parts, e.g. rods or strips}
- 3/045 . . . {the inserts being located in the crown}
- 3/047 . . . {the inserts being located around the gudgeon pin bearings}
- 3/06 . . . the inserts having bimetallic effect
- 3/08 . . . the inserts being ring-shaped
- 3/10 . having surface coverings ([F02F 3/02](#) takes precedence)
- 3/105 . . {the coverings forming a double skirt}
- 3/12 . . on piston heads
- 3/14 . . . within combustion chambers
- 3/16 . having cooling means
- 3/18 . . the means being a liquid or solid coolant, e.g. sodium, in a closed chamber in piston
- 3/20 . . the means being a fluid flowing through or along piston
- 3/22 . . . the fluid being liquid
- 3/225 {the liquid being directed into blind holes}
- 3/24 . having means for guiding gases in cylinders, e.g. for guiding scavenging charge in two-stroke engines
- 3/26 . having combustion chamber in piston head (the surface thereof being covered [F02F 3/14](#))
- 3/28 . Other pistons with specially-shaped head
- 3/285 . . {the head being provided with an insert located in or on the combustion-gas-swept surface}
- 5/00 Piston rings, e.g. associated with piston crown (not used see [F16J 9/00](#))**
- 7/00 Casings, e.g. crankcases (engine casings in general [F16M](#)) {or frames}**
- 7/0002 . {Cylinder arrangements}
- 7/0004 . . {Crankcases of one-cylinder engines}
- 7/0007 . . {Crankcases of engines with cylinders in line}
- 7/0009 . . {Crankcases of opposed piston engines}
- 7/0012 . . {Crankcases of V-engines}
- 7/0014 . . {Crankcases of W-, deldic, or quadratic engines, or the like}
- 7/0017 . . {Crankcases of radial engines}
- 7/0019 . . {Cylinders and crankshaft not in one plane (deaxation)}
- 7/0021 . {Construction}
- 7/0024 . . {Casings for larger engines}
- 7/0026 . . . {Casings for horizontal engines}
- 7/0029 . . {Space-frames}
- 7/0031 . . {Construction kit principle (modular engines)}
- 7/0034 . . {Built from sheet material and welded casings}
- 7/0036 . . {Casings for two-stroke engines with scavenging conduits}
- 7/0039 . . {Casings for small engines, especially with crankcase pumps}
- 2007/0041 . . {Fixing Bolts}
- 7/0043 . {Arrangements of mechanical drive elements}
- 7/0046 . . {Shape of casings adapted to facilitate fitting or dismantling of engine parts}
- 7/0048 . . {Tunnel-type frames}
- 7/0051 . . {Crankcase pump engines}
- 7/0053 . . {Crankshaft bearings fitted in the crankcase}
- 2007/0056 . . . {using bearing beams, i.e. bearings interconnected by a beam or multiple beams}
- 7/0058 . . {Longitudinally or transversely separable crankcases}
- 7/006 . {Camshaft or pushrod housings ([oil sumps \[F01M 11/0004\]\(#\)](#))}
- 2007/0063 . . {Head bolts; Arrangements of cylinder head bolts}
- 7/0065 . {Shape of casings for other machine parts and purposes, e.g. utilisation purposes, safety}
- 7/0068 . . {Adaptations for other accessories}
- 7/007 . . {Adaptations for cooling}
- 7/0073 . . {Adaptations for fitting the engine, e.g. front-plates or bell-housings}
- 2007/0075 . . . {Front covers}
- 2007/0078 . . . {Covers for belt transmissions}
- 7/008 . . {Sound insulation ([see also \[F02B 77/13\]\(#\)](#))}
- 7/0082 . {Mounting of engine casings}

F02F

- 7/0085 . {Materials for constructing engines or their parts}
- 7/0087 . . {Ceramic materials}
- 2007/009 . . {Hypereutectic aluminum, e.g. aluminum alloys with high SI content}
- 2007/0092 . . {Transparent materials}
- 7/0095 . {Constructing engine casings ([welded casings F02F 7/0034](#))}
- 2007/0097 . {for large diesel engines}
- 11/00 Arrangements of sealings in combustion engines**
(piston rings [F02F 5/00](#) {not used, [see F16J 9/00](#)} ; sealings [per se F16J](#))
- 11/002 . {involving cylinder heads}
- 11/005 . {involving cylinder liners}
- 11/007 . {involving rotary applications}
- 2200/00 Manufacturing**
- 2200/02 . Riveting
- 2200/04 . Forging of engine parts
- 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