# CPC - COOPERATIVE PATENT CLASSIFICATION

## MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING

### ENGINES OR PUMPS

**F01**  
MACHINES OR ENGINES IN GENERAL; ENGINE PLANTS IN GENERAL; STEAM ENGINES

**F01B**  
MACHINES OR ENGINES, IN GENERAL OR OF POSITIVE-DISPLACEMENT TYPE, e.g. STEAM ENGINES (of rotary-piston or oscillating-piston type **F01C**; of non-positive-displacement type **F01D**; internal-combustion aspects of reciprocating-piston engines **F02B 57/00**, **F02B 59/00**; crankshafts, crossheads, connecting-rods **F16C**; flywheels **F16F**; gearings for interconverting rotary motion and reciprocating motion in general **F16H**; pistons, piston rods, cylinders, for engines in general **F16J**)

### NOTES

1. This subclass covers, with the exception of the matter provided for in subclasses **F01C** - **F01P**:  
   - engines for elastic fluids, e.g. steam engines;  
   - engines for liquids and elastic fluids;  
   - machines for elastic fluids;  
   - machines for liquids and elastic fluids.

2. Attention is drawn to the note preceding class **F01**, especially as regards the definitions of "steam" and "special vapour".

### WARNING

In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

### Classification

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/00</td>
<td>Reciprocating-piston machines or engines characterised by number or relative disposition of cylinders or by being built-up from separate cylinder-crankcase elements (<strong>F01B 3/00</strong>, <strong>F01B 5/00</strong> take precedence)</td>
</tr>
<tr>
<td>1/01</td>
<td>with one single cylinder</td>
</tr>
<tr>
<td>1/02</td>
<td>with cylinders all in one line</td>
</tr>
<tr>
<td>1/04</td>
<td>with cylinders in V-arrangement</td>
</tr>
<tr>
<td>1/06</td>
<td>with cylinders in star or fan arrangement</td>
</tr>
<tr>
<td>1/0603</td>
<td>[the connection of the pistons with an element being at the outer ends of the cylinders]</td>
</tr>
<tr>
<td>1/0606</td>
<td>[with cam-actuated distribution member(s)]</td>
</tr>
<tr>
<td>1/061</td>
<td>[with two or more series radial piston-cylinder units]</td>
</tr>
<tr>
<td>1/0613</td>
<td>[directly located side by side]</td>
</tr>
<tr>
<td>1/0617</td>
<td>[coupling of several cylinders-barrels]</td>
</tr>
<tr>
<td>1/062</td>
<td>[the connection of the pistons with an actuating or actuated element being at the inner ends of the cylinders]</td>
</tr>
<tr>
<td>1/0624</td>
<td>[with cam-actuated distribution member(s)]</td>
</tr>
<tr>
<td>1/0627</td>
<td>[each machine piston being provided with channels, which are coacting with the cylinder and are used as a distribution member for another piston-cylinder unit]</td>
</tr>
<tr>
<td>1/0631</td>
<td>[the piston-driving or -driven cam being provided with an inlet or an outlet]</td>
</tr>
<tr>
<td>1/0634</td>
<td>[with two or more series radial piston-cylinder units]</td>
</tr>
<tr>
<td>1/0637</td>
<td>[directly located side by side]</td>
</tr>
<tr>
<td>1/0641</td>
<td>[Details, component parts specially adapted for such machines]</td>
</tr>
<tr>
<td>1/0644</td>
<td>[Pistons]</td>
</tr>
<tr>
<td>1/0648</td>
<td>[Cams]</td>
</tr>
<tr>
<td>1/0651</td>
<td>[consisting of several cylindrical elements, e.g. rollers]</td>
</tr>
<tr>
<td>1/0655</td>
<td>[cylinders]</td>
</tr>
<tr>
<td>1/0658</td>
<td>[Arrangements for pressing or connecting the pistons against the actuating or actuated cam]</td>
</tr>
<tr>
<td>1/0662</td>
<td>[hydraulically]</td>
</tr>
<tr>
<td>1/0665</td>
<td>[Disconnecting the pistons from the actuating or actuated cam (in general <strong>F01B 31/24</strong>)]</td>
</tr>
<tr>
<td>1/0668</td>
<td>[Supporting and guiding means for the piston]</td>
</tr>
<tr>
<td>1/0672</td>
<td>[Draining of the machine housing; arrangements dealing with leakage fluid]</td>
</tr>
<tr>
<td>1/0675</td>
<td>[Controlling]</td>
</tr>
<tr>
<td>1/0679</td>
<td>[by using a valve in a system with several pump or motor chambers, wherein the flow path through the chambers can be changed, e.g. series-parallel]</td>
</tr>
<tr>
<td>1/0682</td>
<td>[by changing the effective cross sectional piston working surface]</td>
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<tr>
<td>1/0686</td>
<td>[by changing the effective piston stroke]</td>
</tr>
<tr>
<td>1/0689</td>
<td>[by changing the excentricity of one element relative to another element]</td>
</tr>
<tr>
<td>1/0693</td>
<td>[by changing the phase relationship between two actuating or actuated cams]</td>
</tr>
<tr>
<td>1/0696</td>
<td>[by changing the phase relationship between the actuating or actuated cam and the distributing means]</td>
</tr>
</tbody>
</table>
Reciprocating-piston machines or engines with cylinder axes coaxial with, or parallel or inclined to, main shaft axis

- Separate cylinder-crankcase elements coupled together to form a unit

- Control of working-fluid admission or discharge peculiar thereto (suitable for more general application F01L)

- (for machines with stationary cylinders)

- (Changing the piston stroke by changing the position of the swash plate)

- (for machines with rotary cylinder block)

- (by turning the valve plate)

- (by moving the swash plate in a direction perpendicular to the axis of rotation of the cylinder barrel)

- (by changing the inclination of the swash plate)

- (using wedges)

- (by turning the swash plate (with fixed inclination))

- (by changing the inclination of the axis of the cylinder barrel relative to the swash plate (F01B 3/106 takes precedence))

Reciprocating-piston machines or engines with cylinder axes arranged substantially tangentially to a circle centred on main shaft axis

- (the connection of the pistons with an actuated or acting element being at the outer ends of the cylinders)

- (the connection of the pistons with an actuated or actuating element being at the inner ends of the cylinders)

Machines or engines with two or more pistons reciprocating within same cylinder or within essentially coaxial cylinders (in opposite arrangement relative to main shaft F01B 1/08)

- with oppositely reciprocating pistons

- acting on same main shaft

- using only connecting-rods for conversion of reciprocatory into rotary motion or vice versa

- with side rods

- having piston-rods of one piston passed through other piston

- using rockers and connecting-rods

- acting on different main shafts

- with pistons synchronously moving in tandem arrangement

- with differential piston (F01B 7/20 takes precedence)

- with two or more pistons reciprocating one within another, e.g. one piston forming cylinder of the other

Reciprocating-piston machines or engines characterised by connections between pistons and main shafts and not specific to preceding groups (connections disengageable during idling F01B 31/24)

- with crankshaft

- of Bourke-type or Scotch yoke

- (Rigid connections between piston yoke and crankshaft)

- with rotary main shaft other than crankshaft

- (the connections comprising gear transmissions)

- (Planetary gearings)

- (with rack and pinion)

- the piston motion being transmitted by curved surfaces
Reciprocating-piston machines or engines

11/00 Reciprocating-piston machines or engines without rotary main shaft, e.g. of free-piston type

11/001 [in which the movement in the two directions is obtained by one double acting piston motor]
11/002 [one side of the double acting piston motor being always under the influence of the fluid under pressure]
11/003 [the fluid under pressure being continuously delivered to one motor chamber and reacting the other chamber through a valve located in the piston, to bring the piston back in its start-position]
11/004 [in which the movement in the two directions is obtained by two single acting piston motors, each acting in one direction]

2011/005 [with oscillating pistons, i.e. the pistons are arranged in ring like cylinder sections and oscillate with respect to the center of the ring]
11/006 [one single acting piston motor being always under the influence of the fluid under pressure]
11/007 [in which the movement in only one direction is obtained by a single acting piston motor, e.g. with actuation in the other direction by spring means]
11/008 [with actuation in the other direction by gravity]
11/009 [in which the movement in two directions is obtained by two or more double acting piston motors]
11/02 Equalising or cushioning devices
11/04 Engines combined with reciprocatory driven devices, e.g. hammers (with pumps F01B 23/08; predominating aspects of driven devices, see the relevant classes for the devices)
11/06 for generating vibration only
11/08 with direct fluid transmission link (F01B 11/02 takes precedence)

13/00 Reciprocating-piston machines or engines with rotating cylinders in order to obtain the reciprocating-piston motion (machines or engines of flexible-wall type F01B 19/00)

13/02 with one cylinder only
13/04 with more than one cylinder (F01B 3/0032 takes precedence)
13/045 [with cylinder axes arranged substantially tangentially to a circle centred on main shaft axis]
13/06 in star arrangement
13/061 [the connection of the pistons with the actuated or actuating element being at the outer ends of the cylinders]
13/062 [cylinder block and actuating or actuated cam both rotating (F01B 13/064 and F01B 13/066 take precedence)]
13/063 [with two or more series radial piston-cylinder units]
13/064 [cylinder block and actuating or actuated cam both rotating (F01B 13/066 takes precedence)]
13/065 [directly located side by side]

13/066 [cylinder block and actuating or actuated cam both rotating]
13/067 [with pistons and cylinders having two different parallel axis of rotation]
13/068 [the connection of the pistons with an actuated or actuating element being at the inner ends of the cylinders]

15/00 Reciprocating-piston machines or engines with movable cylinders other than provided for in group F01B 13/00 (with movable cylinder sleeves for working fluid control F01L)

15/002 [having cylinders in star or fan arrangement, the connection of the pistons with the actuated or actuating element being at the outer ends of the cylinders]
15/005 [having cylinders in star or fan arrangement, the connection of the pistons with the actuated or actuating element being at the inner ends of the cylinders]
15/007 [having spinning cylinders, i.e. the cylinders rotating about their longitudinal axis]
15/02 with reciprocating cylinders (with one piston within another F01B 7/20)
15/04 with oscillating cylinder
15/06 Control of working-fluid admission or discharge peculiar thereto
15/065 [by cam-actuated distribution members]

17/00 Reciprocating-piston machines or engines characterised by use of uniflow principle

17/02 [Engines]
17/022 [with fluid heating]
17/025 [using liquid air]
17/027 [using separators]
17/04 [Steam engines]

NOTE in this group the following indexing codes are used:
F01B 2170/0411 - F01B 2170/0494

19/00 Positive-displacement machines or engines of flexible-wall type

19/02 with plate-like flexible members
19/04 with tubular flexible members

21/00 Combinations of two or more machines or engines (F01B 23/00) takes precedence; regulating or controlling, see the relevant groups; combinations of two or more pumps F04; fluid gearing F16H)

21/02 the machines or engines being all of reciprocating-piston type
21/04 the machines or engines being not all of reciprocating-piston type, e.g. of reciprocating steam engine with steam turbine

23/00 Adaptations of machines or engines for special use; Combinations of engines with devices driven thereby (F01B 11/00 takes precedence; fluid gearing F16H; aspects predominantly concerning driven devices, see the relevant classes for these devices; regulating or controlling, see the relevant groups)

23/02 Adaptations for driving vehicles, e.g. locomotives (arrangements in vehicles, see the relevant classes for vehicles)
23/04 the vehicles being waterborne vessels

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23/06 . Adaptations for driving, or combinations with, hand-held tools or the like
23/08 . Adaptations for driving, or combinations with, pumps
23/10 . Adaptations for driving, or combinations with, electric generators
23/12 . Adaptations for driving rolling mills or other heavy reversing machinery

25/00 Regulating, controlling, or safety means (regulating or controlling in general G05)

NOTE in this group the following indexing codes are used:
   F01B 2250/001 - F01B 2250/009

25/02 . Regulating or controlling by varying working-fluid admission or exhaust, e.g. by varying pressure or quantity (regulating or controlling in general F01L)
25/04 . . . Sensing elements
25/06 . . . . responsive to speed
25/08 . . . . Final actuators
25/10 . . . . Arrangements or adaptations of working-fluid admission or discharge valves (valves in general F16K)
25/12 . . . Devices dealing with sensing elements or final actuators or transmitting means between them, e.g. power-assisted (sensing elements alone F01B 25/04; final actuators alone F01B 25/08)
25/14 . . . peculiar to particular kinds of machines or engines
25/16 . Safety means responsive to specific conditions (against water hammer or the like in steam engines F01B 31/34)
25/18 . . . preventing rotation in wrong direction
25/20 . Checking operation on safety devices
25/22 . Braking by redirecting working-fluid
25/24 . . . thereby regenerating energy
25/26 . . . Warning devices

27/00 Starting of machines or engines (starting combustion engines F02N)

27/02 . . of reciprocating-piston engines
27/04 . . by directing working-fluid supply, e.g. by aid of by-pass steam conduits
27/06 . . . specially for compound engines
27/08 . . . Means for moving crank off dead-centre (turning-gear in general F16H)

29/00 Machines or engines with pertinent characteristics other than those provided for in preceding main groups

29/02 . Atmospheric engines, i.e. atmosphere acting against vacuum
29/04 . . . characterised by means for converting from one type to a different one
29/06 . . . from steam engine into combustion engine
29/08 . Reciprocating-piston machines or engines not otherwise provided for
29/10 . . . Engines (refrigeration machines F25B)
29/12 . . . Steam engines (toy steam engines A63H 29/16)

31/00 Component parts, details, or accessories not provided for in, or of interest apart from, other groups (machine or engine casings, other than those peculiar to steam engines, F16M)

31/005 . (Silencing equipment (silencing for steam engines F01B 31/16))
31/02 . De-icing means for engines having icing phenomena
31/04 . Means for equalising torque in reciprocating-piston machines or engines (compensation of inertial forces, suppression of vibration in systems F16F)
31/06 . Means for compensating relative expansion of component parts
31/08 . Cooling of steam engines (cooling of fluid machines or engines in general F01P); Heating; Heat insulation (heat insulation in general F16L 59/00)
31/10 . Lubricating arrangements of steam engines (of fluid machines or engines in general F01M)
31/12 . Arrangements of measuring or indicating devices (warning apparatus F01B 25/26; measuring instruments or the like per se G01)
31/14 . Changing of compression ratio
31/16 . Silencers specially adapted for steam engines (arrangements of exhaust pipes or tubes on steam engines F01B 31/30; gas-flow silencers or exhauster silencers for machines or engines in general F01N)

31/18 . Draining
31/20 . . . . of cylinders
31/22 . Idling devices, e.g. having by-passing valves
31/24 . . . . Disengagement of connections between pistons and main shafts
31/26 . . . . Other component parts, details, or accessories, peculiar to steam engines
31/28 . . . . Cylinders or cylinder covers
31/30 . . . . Arrangements of steam conduits
31/32 . . . . Arrangements or adaptations of vacuum breakers
31/34 . . . . Safety means against water hammers or against the penetration of water (steam traps F16T)
31/36 . . . . automatically cutting-off steam supply

2170/00 Steam engines, e.g. for locomotives or ships

2170/004 . . To-be-deleted with administrative transfer to parent group
2170/005 . . To-be-deleted with administrative transfer to parent group
2170/0411 . . . for locomotives
2170/0417 . . . for locomobiles driven by small motors
2170/0423 . . . Single acting steam engines with 1, 2 or 3 cylinders
2170/0429 . . . Double acting high pressure machines
2170/0435 . . . Compound machines with double or plural expansion; Auxiliaries driven by main engine
2170/0441 . . . Compound engines with monolytic pistons in same cylinder
2170/0447 . . . Machines with more than one piston in a cylinder and with counter moving pistons
2170/0452 . . . Engines without connecting rods
2170/0458 . . . Moving cylinders for steam engines, e.g. with telescopic cylinder arrangements
2170/0464 . . . Oscillating cylinders for steam engines
2170/047 . . . General arrangements for steam engines
2170/0476 . . . Components or parts for steam engines
2170/0482 . . . with toroidal cylinder space
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2170/0488</td>
<td>To-be-deleted with administrative transfer to parent group</td>
</tr>
<tr>
<td>2170/0494</td>
<td>with fixed cylinder space</td>
</tr>
<tr>
<td>2250/00</td>
<td><strong>Accessories of steam engines; Arrangements or control devices of piston pumps, compressors without crank shafts or condensers for so far as they influence the functioning of the engines</strong></td>
</tr>
<tr>
<td>2250/001</td>
<td>Valves for steam inlet or outlet</td>
</tr>
<tr>
<td>2250/002</td>
<td>Valves, brakes, control or safety devices for steam engines</td>
</tr>
<tr>
<td>2250/003</td>
<td>Apparatus for control or receiver or condensor pressure</td>
</tr>
<tr>
<td>2250/004</td>
<td>Devices for draining or idling of steam cylinders or for uncoupling piston and connecting rod</td>
</tr>
<tr>
<td>2250/005</td>
<td>Oil separators for steam engines</td>
</tr>
<tr>
<td>2250/006</td>
<td>Arrangement of or controlling of piston pumps or compressors without crank shaft</td>
</tr>
<tr>
<td>2250/007</td>
<td>Condensing devices for steam engines</td>
</tr>
<tr>
<td>2250/008</td>
<td>Surface condensors for so far as they influence the functioning of the engine</td>
</tr>
<tr>
<td>2250/009</td>
<td>Condenser pumps for steam engines</td>
</tr>
</tbody>
</table>