

CPC COOPERATIVE PATENT CLASSIFICATION

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

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

- 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.
- 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.

1/00	Reciprocating-piston machines or engines characterised by number or relative disposition of cylinders or by being built-up from separate cylinder-crankcase elements (F01B 3/00, F01B 5/00 take precedence)	1/0641	. . . {Details, component parts specially adapted for such machines}
		1/0644	. . . {Pistons}
		1/0648	. . . {Cams}
		1/0651	. . . . {consisting of several cylindrical elements, e.g. rollers}
1/01	. with one single cylinder	1/0655	. . . {cylinders}
1/02	. with cylinders all in one line	1/0658	. . . {Arrangements for pressing or connecting the pistons against the actuating or actuated cam}
1/04	. with cylinders in V-arrangement	1/0662	. . . . {hydraulically}
1/06	. with cylinders in star or fan arrangement	1/0665	. . . . {Disconnecting the pistons from the actuating or actuated cam (in general F01B 31/24)}
1/0603	. . {the connection of the pistons with an element being at the outer ends of the cylinders}	1/0668	. . . . {Supporting and guiding means for the piston}
1/0606	. . . {with cam-actuated distribution member(s)}	1/0672	. . . . {Draining of the machine housing; arrangements dealing with leakage fluid}
1/061	. . . {with two or more series radial piston-cylinder units}	1/0675	. . . {Controlling}
1/0613	. . . . {directly located side by side}	1/0679	. . . . {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}
1/0617	. . . . {coupling of several cylinders-barrels}	1/0682	. . . . {by changing the effective cross sectional piston working surface}
1/062	. . {the connection of the pistons with an actuating or actuated element being at the inner ends of the cylinders}	1/0686	. . . . {by changing the effective piston stroke}
1/0624	. . . . {with cam-actuated distribution member(s)}	1/0689	. . . . {by changing the excentricity of one element relative to another element}
1/0627	. . . . {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}	1/0693	. . . . {by changing the phase relationship between two actuating or actuated cams}
1/0631	. . . . {the piston-driving or -driven cam being provided with an inlet or an outlet}	1/0696	. . . . {by changing the phase relationship between the actuating or actuated cam and the distributing means}
1/0634	. . . . {with two or more series radial piston-cylinder units}		
1/0637	. . . . {directly located side by side}		

- 1/08 . with cylinders arranged oppositely relative to main shaft and of "flat" type
- 1/10 . with more than one main shaft, e.g. coupled to common output shaft ([combinations of two or more machines or engines F01B 21/00](#))
- 1/12 . Separate cylinder-crankcase elements coupled together to form a unit
- 3/00 Reciprocating-piston machines or engines with cylinder axes coaxial with, or parallel or inclined to, main shaft axis**
- 3/0002 . {having stationary cylinders}
- 3/0005 . . {having two or more sets of cylinders or pistons}
- 3/0008 . . {having self-acting distribution members, e.g. actuated by working fluid}
- 3/0011 . . . {Cylindrical distribution members}
- 3/0014 . . . {Conical distribution members}
- 3/0017 . . {Component parts, details, e.g. sealings, lubrication}
- 3/002 . . . {Cylinders}
- 3/0023 . . . {Actuating or actuated elements}
- 3/0026 {Actuating or actuated element bearing means or driving or driven axis bearing means}
- 3/0029 . . . {Casings, housings}
- 3/0032 . {having rotary cylinder block}
- 3/0035 . . {having two or more sets of cylinders or pistons}
- 3/0038 . . . {inclined to main shaft axis}
- 3/0041 . . {Arrangements for pressing the cylinder barrel against the valve plate, e.g. fluid pressure}
- 3/0044 . . {Component parts, details, e.g. valves, sealings, lubrication}
- 3/0047 . . . {Particularities in the contacting area between cylinder barrel and valve plate}
- 3/005 {Bearing arrangements}
- 3/0052 . . . {Cylinder barrel}
- 3/0055 . . . {Valve means, e.g. valve plate}
- 3/0058 {Cylindrical valve means}
- 3/0061 {Conical valve means}
- 3/0064 . . . {Machine housing}
- 3/0067 {cylinder barrel bearing means}
- 3/007 . . . {Swash plate}
- 3/0073 {swash plate bearing means or driving or driven axis bearing means}
- 3/0076 . . {Connection between cylinder barrel and inclined swash plate}
- 3/0079 . {having pistons with rotary and reciprocating motion, i.e. spinning pistons}
- 3/0082 . {Details}
- 3/0085 . . {Pistons}
- 3/0088 . . . {Piston shoe retaining means}
- 3/0091 . . {Casings, housings}
- 3/0094 . . {Driving or driven means}
- 2003/0097 . . . {Z-shafts, i.e. driven or driving shafts in Z-form}
- 3/02 . with wobble-plate
- 3/04 . the piston motion being transmitted by curved surfaces
- 3/045 . . {by two or more curved surfaces, e.g. for two or more pistons in one cylinder}
- 3/06 . . by multi-turn helical surfaces and automatic reversal
- 3/08 . . . the helices being arranged on the pistons
- 3/10 . Control of working-fluid admission or discharge peculiar thereto ([suitable for more general application F01L](#))
- 3/101 . . {for machines with stationary cylinders}
- 3/102 . . . {Changing the piston stroke by changing the position of the swash plate}
- 3/103 . . {for machines with rotary cylinder block}
- 3/104 . . . {by turning the valve plate}
- 3/105 . . . {by moving the swash plate in a direction perpendicular to the axis of rotation of the cylinder barrel}
- 3/106 . . . {by changing the inclination of the swash plate}
- 3/107 {using wedges}
- 3/108 . . . {by turning the swash plate (with fixed inclination)}
- 3/109 . . . {by changing the inclination of the axis of the cylinder barrel relative to the swash plate ([F01B 3/106 takes precedence](#))}
- 5/00 Reciprocating-piston machines or engines with cylinder axes arranged substantially tangentially to a circle centred on main shaft axis**
- 5/003 . {the connection of the pistons with an actuated or actuating element being at the outer ends of the cylinders}
- 5/006 . {the connection of the pistons with an actuated or actuating element being at the inner ends of the cylinders}
- 7/00 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](#))**
- 7/02 . with oppositely reciprocating pistons
- 7/04 . . acting on same main shaft
- 7/06 . . . using only connecting-rods for conversion of reciprocatory into rotary motion or *vice versa*
- 7/08 with side rods
- 7/10 having piston-rod of one piston passed through other piston
- 7/12 . . . using rockers and connecting-rods
- 7/14 . . acting on different main shafts
- 7/16 . with pistons synchronously moving in tandem arrangement
- 7/18 . with differential piston ([F01B 7/20 takes precedence](#))
- 7/20 . with two or more pistons reciprocating one within another, e.g. one piston forming cylinder of the other
- 9/00 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](#))**
- 9/02 . with crankshaft
- 9/023 . . {of Bourke-type or Scotch yoke}
- 9/026 . . {Rigid connections between piston and rod; Oscillating pistons}
- 9/04 . with rotary main shaft other than crankshaft
- 9/042 . . {the connections comprising gear transmissions}
- 2009/045 . . . {Planetary gearings}
- 9/047 . . {with rack and pinion}
- 9/06 . . the piston motion being transmitted by curved surfaces

- 2009/061 . . . {by cams}
- 2009/063 {Mono-lobe cams}
- 2009/065 {Bi-lobe cams}
- 2009/066 {Tri-lobe cams}
- 2009/068 {Quadri-lobe cams}
- 9/08 . . with ratchet and pawl
- 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

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)	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)
	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 (distributing or expansion valve gear F01L)	31/005	• { Silencing equipment (silencing for steam engines F01B 31/16) }
25/04	• Sensing elements	31/02	• De-icing means for engines having icing phenomena
25/06	• . . responsive to speed	31/04	• Means for equalising torque in reciprocating-piston machines or engines (compensation of inertial forces, suppression of vibration in systems F16F)
25/08	• . Final actuators	31/06	• Means for compensating relative expansion of component parts
25/10	• . . Arrangements or adaptations of working-fluid admission or discharge valves (valves in general F16K)	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)
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)	31/10	• Lubricating arrangements of steam engines (of fluid machines or engines in general F01M)
25/14	• . peculiar to particular kinds of machines or engines	31/12	• Arrangements of measuring or indicating devices (warning apparatus F01B 25/26 ; measuring instruments or the like per se G01)
25/16	• Safety means responsive to specific conditions (against water hammer or the like in steam engines F01B 31/34)	31/14	• Changing of compression ratio
25/18	• . preventing rotation in wrong direction	31/16	• Silencers specially adapted for steam engines (arrangements of exhaust pipes or tubes on steam engines F01B 31/30 ; gas-flow silencers or exhaust silencers for machines or engines in general F01N)
25/20	• Checking operation on safety devices	31/18	• Draining
25/22	• Braking by redirecting working-fluid	31/20	• . of cylinders
25/24	• . thereby regenerating energy	31/22	• Idling devices, e.g. having by-passing valves
25/26	• Warning devices	31/24	• . Disengagement of connections between pistons and main shafts
27/00	Starting of machines or engines (starting combustion engines F02N)	31/26	• Other component parts, details, or accessories, peculiar to steam engines
27/02	• of reciprocating-piston engines	31/28	• . Cylinders or cylinder covers
27/04	• . by directing working-fluid supply, e.g. by aid of by-pass steam conduits	31/30	• . Arrangements of steam conduits
27/06	• . . specially for compound engines	31/32	• . Arrangements or adaptations of vacuum breakers
27/08	• . Means for moving crank off dead-centre (turning-gear in general F16H)	31/34	• . Safety means against water hammers or against the penetration of water (steam traps F16T)
29/00	Machines or engines with pertinent characteristics other than those provided for in preceding main groups	31/36	• . . automatically cutting-off steam supply
29/02	• Atmospheric engines, i.e. atmosphere acting against vacuum	2170/00	Steam engines, e.g. for locomotives or ships
29/04	• characterised by means for converting from one type to a different one	2170/04	• To-be-deleted with administrative transfer to parent group
29/06	• . from steam engine into combustion engine	2170/0405	• . To-be-deleted with administrative transfer to parent group
29/08	• Reciprocating-piston machines or engines not otherwise provided for	2170/0411	• . . for locomotives
29/10	• . Engines (refrigeration machines F25B)	2170/0417	• . . for locomobiles driven by small motors
29/12	• . . Steam engines (toy steam engines A63H 29/16)	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

F01B

2170/0488 To-be-deleted with administrative transfer to parent group

2170/0494 with fixed cylinder space

2250/00 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

2250/001 . Valves for steam inlet or outlet

2250/002 . Valves, brakes, control or safety devices for steam engines

2250/003 . Apparatus for control or receiver or condensor pressure

2250/004 . Devices for draining or idling of steam cylinders or for uncoupling piston and connecting rod

2250/005 . Oil separators for steam engines

2250/006 . Arrangement of or controlling of piston pumps or compressors without crank shaft

2250/007 . Condensing devices for steam engines

2250/008 . Surface condensers for so far as they influence the functioning of the engine

2250/009 . Condenser pumps for steam engines