

CPC COOPERATIVE PATENT CLASSIFICATION

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

ENGINES OR PUMPS

F01 MACHINES OR ENGINES IN GENERAL (combustion engines [F02](#); machines for liquids [F03](#), [F04](#)); 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".

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)	1/0651	. . . . {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 coaxing 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}	1/08	. with cylinders arranged oppositely relative to main shaft and of "flat" type
1/0637	. . . . {directly located side by side}	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)
1/0641	. . {Details, component parts specially adapted for such machines}	1/12	. Separate cylinder-crankcase elements coupled together to form a unit
1/0644	. . . {Pistons}		
1/0648	. . . {Cams}		

3/00	Reciprocating-piston machines or engines with cylinder axes coaxial with, or parallel or inclined to, main shaft axis	3/105	. . . {by moving the swash plate in a direction perpendicular to the axis of rotation of the cylinder barrel}
3/0002	. {having stationary cylinders}	3/106	. . . {by changing the inclination of the swash plate}
3/0005	. . {having two or more sets of cylinders or pistons}	3/107	. . . . {using wedges}
3/0008	. . {having self-acting distribution members, e.g. actuated by working fluid}	3/108	. . . {by turning the swash plate (with fixed inclination)}
3/0011	. . . {Cylindrical distribution members}	3/109	. . . {by changing the inclination of the axis of the cylinder barrel relative to the swash plate (F01B 3/106 takes precedence) }
3/0014	. . . {Conical distribution members}	5/00	Reciprocating-piston machines or engines with cylinder axes arranged substantially tangentially to a circle centred on main shaft axis
3/0017	. . {Component parts, details, e.g. sealings, lubrication}	5/003	. {the connection of the pistons with an actuated or actuating element being at the outer ends of the cylinders}
3/002	. . . {Cylinders}	5/006	. {the connection of the pistons with an actuated or actuating element being at the inner ends of the cylinders}
3/0023	. . . {Actuating or actuated elements}	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)
3/0026	. . . . {Actuating or actuated element bearing means or driving or driven axis bearing means}	7/02	. with oppositely reciprocating pistons
3/0029	. . . {Casings, housings}	7/04	. . acting on same main shaft
3/0032	. {having rotary cylinder block}	7/06	. . . using only connecting-rods for conversion of reciprocatory into rotary motion or <u>vice versa</u>
3/0035	. . {having two or more sets of cylinders or pistons}	7/08	. . . . with side rods
3/0038	. . . {inclined to main shaft axis}	7/10	. . . . having piston-rod of one piston passed through other piston
3/0041	. . {Arrangements for pressing the cylinder barrel against the valve plate, e.g. fluid pressure}	7/12	. . . using rockers and connecting-rods
3/0044	. . {Component parts, details, e.g. valves, sealings, lubrication}	7/14	. . acting on different main shafts
3/0047	. . . {Particularities in the contacting area between cylinder barrel and valve plate}	7/16	. with pistons synchronously moving in tandem arrangement
3/005	. . . . {Bearing arrangements}	7/18	. with differential piston (F01B 7/20 takes precedence)
3/0052	. . . {Cylinder barrel}	7/20	. with two or more pistons reciprocating one within another, e.g. one piston forming cylinder of the other
3/0055	. . . {Valve means, e.g. valve plate}	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)
3/0058	. . . . {Cylindrical valve means}	9/02	. with crankshaft
3/0061	. . . . {Conical valve means}	9/023	. . {of Bourke-type or Scotch yoke}
3/0064	. . . {Machine housing}	9/026	. . {Rigid connections between piston and rod; Oscillating pistons}
3/0067	. . . . {cylinder barrel bearing means}	9/04	. with rotary main shaft other than crankshaft
3/007	. . . {Swash plate}	9/042	. . {the connections comprising gear transmissions}
3/0073	. . . . {swash plate bearing means or driving or driven axis bearing means}	2009/045	. . . {Planetary gearings}
3/0076	. . {Connection between cylinder barrel and inclined swash plate}	9/047	. . {with rack and pinion}
3/0079	. {having pistons with rotary and reciprocating motion, i.e. spinning pistons}	9/06	. . the piston motion being transmitted by curved surfaces
3/0082	. {Details}	2009/061	. . . {by cams}
3/0085	. . {Pistons}	2009/063	. . . . {Mono-lobe cams}
3/0088	. . . {Piston shoe retaining means}	2009/065	. . . . {Bi-lobe cams}
3/0091	. . {Casings, housings}	2009/066	. . . . {Tri-lobe cams}
3/0094	. . {Driving or driven means}	2009/068	. . . . {Quadri-lobe cams}
2003/0097	. . . {Z-shafts, i.e. driven or driving shafts in Z-form}	9/08	. . with ratchet and pawl
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}		

11/00	Reciprocating-piston machines or engines without rotary main shaft, e.g. of free-piston type	13/068	. . . {the connection of the pistons with an actuated or actuating element being at the inner ends of the cylinders}
11/001	. {in which the movement in the two directions is obtained by one double acting piston motor}	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)
11/002	. . {one side of the double acting piston motor being always under the influence of the fluid under pressure}	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}
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}	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}
11/004	. {in which the movement in the two directions is obtained by two single acting piston motors, each acting in one direction}	15/007	. {having spinning cylinders, i.e. the cylinders rotating about their longitudinal axis}
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}	15/02	. with reciprocating cylinders (with one piston within another F01B 7/20)
11/006	. . {one single acting piston motor being always under the influence of the fluid under pressure}	15/04	. with oscillating cylinder
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}	15/06	. . Control of working-fluid admission or discharge peculiar thereto
11/008	. . {with actuation in the other direction by gravity}	15/065	. . . {by cam-actuated distribution members}
11/009	. {in which the movement in two directions is obtained by two or more double acting piston motors}	17/00	Reciprocating-piston machines or engines characterised by use of uniflow principle
11/02	. Equalising or cushioning devices	17/02	. Engines
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)	17/022	. . {with fluid heating}
11/06	. . for generating vibration only	17/025	. . {using liquid air}
11/08	. with direct fluid transmission link (F01B 11/02 takes precedence)	17/027	. . {using separators}
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)	17/04	. . Steam engines
13/02	. with one cylinder only	NOTE	
13/04	. with more than one cylinder {(F01B 3/0032 takes precedence)}		in this group the following indexing codes are used: F01B 2170/0411 - F01B 2170/0494
13/045	. . {with cylinder axes arranged substantially tangentially to a circle centred on main shaft axis}	19/00	Positive-displacement machines or engines of flexible-wall type
13/06	. . in star arrangement	19/02	. with plate-like flexible members
13/061	. . . {the connection of the pistons with the actuated or actuating element being at the outer ends of the cylinders}	19/04	. with tubular flexible members
13/062	. . . . {cylinder block and actuating or actuated cam both rotating (F01B 13/064 and F01B 13/066 take precedence)}	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)
13/063	. . . . {with two or more series radial piston-cylinder units}	21/02	. the machines or engines being all of reciprocating-piston type
13/064	. . . . . {cylinder block and actuating or actuated cam both rotating (F01B 13/066 takes precedence)}	21/04	. the machines or engines being not all of reciprocating-piston type, e.g. of reciprocating steam engine with steam turbine
13/065	. . . . . {directly located side by side}	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)
13/066	. . . . . {cylinder block and actuating or actuated cam both rotating}	23/02	. Adaptations for driving vehicles, e.g. locomotives (arrangements in vehicles, see the relevant classes for vehicles)
13/067	. . . . . {with pistons and cylinders having two different parallel axis of rotation}	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](#))**
- 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 \[F01L\]\(#\)](#))
- 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 exhaust 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**
- 2170/04 . To-be-deleted with administrative transfer to parent group
- 2170/0405 . . 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
- 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