

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](#))
- 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; 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](#))**
- 23/02 . Adaptations for driving vehicles, e.g. locomotives
- 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

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- 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 condensors for so far as they influence the functioning of the engine
- 2250/009 . Condenser pumps for steam engines