

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 engines [F02B](#); combustion-product engine plants [F02G](#); machines or engines, other than of positive-displacement type, for liquids [F03B](#); positive-displacement engines driven by liquids [F03C](#); wind motors [F03D](#); positive-displacement machines for liquids [F04B](#); rotary-piston, or oscillating-piston, positive-displacement machines for liquids [F04C](#))

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".
- {In this subclass, it is desirable to add the indexing codes of groups [F01B 2171/00](#) and [F01B 2250/00](#).}

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)	1/0644	. . . {Pistons}
		1/0648	. . . {Cams}
		1/0651	. . . . {consisting of several cylindrical elements, e.g. rollers}
		1/0655	. . . {cylinders}
1/01	. with one single cylinder	1/0658	. . . {Arrangements for pressing or connecting the pistons against the actuating or actuated cam}
1/02	. with cylinders all in one line		
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}
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}		
1/062	. . {the connection of the pistons with an actuating or actuated element being at the inner ends of the cylinders}	1/0682	. . . {by changing the effective cross sectional piston working surface}
1/0624	. . . {with cam-actuated distribution member(s)}	1/0686	. . . {by changing the effective piston stroke}
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}	1/0689	. . . . {by changing the excentricity of one element relative to another element}
1/0631	. . . {the piston-driving or -driven cam being provided with an inlet or an outlet}	1/0693	. . . {by changing the phase relationship between two actuating or actuated cams}
1/0634	. . . {with two or more series radial piston-cylinder units}	1/0696	. . . {by changing the phase relationship between the actuating or actuated cam and the distributing means}
1/0637	. . . . {directly located side by side}		
1/0641	. . {Details, component parts specially adapted for such machines}	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
- 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
- 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}
- 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, not specific to groups [F01B 1/00](#) - [F01B 7/00](#)**
- 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
- 11/06 . . for generating vibration only
- 11/08 . with direct fluid transmission link
- 13/00 Reciprocating-piston machines or engines with rotating cylinders in order to obtain the reciprocating-piston motion**
- 13/02 . with one cylinder only
- 13/04 . with more than one cylinder
- 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}
- 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](#)**
- 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
- 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)**
- 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**
- 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 ([controlling combustion engines \[F02D\]\(#\)](#))**
- 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
- 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

- 25/12 . . Devices dealing with sensing elements or final actuators or transmitting means between them, e.g. power-assisted
- 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
- 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
- 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**
- 31/005 . {[Silencing equipment \(F01B 31/16 takes precedence\)](#)}
- 31/02 . De-icing means for engines having icing phenomena
- 31/04 . Means for equalising torque in reciprocating-piston machines or engines
- 31/06 . Means for compensating relative expansion of component parts
- 31/08 . Cooling of steam engines; Heating; Heat insulation
- 31/10 . Lubricating arrangements of steam engines
- 31/12 . Arrangements of measuring or indicating devices
- 31/14 . Changing of compression ratio
- 31/16 . Silencers specially adapted for steam engines
- 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 hammer or against the penetration of water
- 31/36 . . . automatically cutting-off steam supply

Indexing codes for special structural or operational features of steam engines

2171/00 Details or adaptations of steam engines, e.g. for locomotives or ships

- 2171/01 . for locomotives
- 2171/02 . for locomobiles
- 2171/03 . Single-acting steam engines with 1, 2 or 3 cylinders
- 2171/04 . Double-acting high pressure steam engines
- 2171/05 . Compound steam engines with double or multiple expansion; Auxiliaries driven by main engine
- 2171/06 . Compound engines using monolithic piston in same cylinder
- 2171/07 . Steam engines with two or more pistons per cylinder with counter-moving pistons
- 2171/08 . Steam engines without connecting rods
- 2171/09 . Steam engines with moving cylinders, e.g. telescopic cylinder arrangements
- 2171/11 . Oscillating cylinder arrangements
- 2171/12 . with toroidal cylinder spaces
- 2171/13 . Components or parts for steam engines

Indexing codes for accessories or auxiliary arrangements influencing the functioning of steam engines

2250/00 Accessories of steam engines; Arrangements or control devices of pumps, compressors or condensers, insofar as they influence the functioning of the steam engines

- 2250/001 . Valves for steam inlet or outlet
- 2250/002 . Valves, brakes, control or safety devices for steam engines
- 2250/003 . Apparatus for controlling receiver or condenser 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