

CPC**COOPERATIVE PATENT CLASSIFICATION****F01B**

MACHINES OR ENGINES, IN GENERAL OR OF POSITIVE-DISPLACEMENT TYPE, e.g. STEAM ENGINES (of rotaty-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](#))

NOTE

This subclass covers, with the exception of the matter provided for in subclasses [F01C](#) to [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".

F01B 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)

F01B 1/01

- . with one single cylinder

F01B 1/02

- . with cylinders all in one line

F01B 1/04

- . with cylinders in V-arrangement

F01B 1/06

- . with cylinders in star or fan arrangement

F01B 1/0603

- .. {the connection of the pistons with an element being at the outer ends of the cylinders }

F01B 1/0606

- ... {with cam-actuated distribution member(s) }

F01B 1/061

- ... {with two or more series radial piston-cylinder units }

F01B 1/0613

- {directly located side by side }

F01B 1/0617

- {coupling of several cylinders-barrels }

F01B 1/062

- .. {the connection of the pistons with an actuating or actuated element being at the inner ends of the cylinders }

F01B 1/0624

- ... {with cam-actuated distribution member(s) }

F01B 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 }

F01B 1/0631

- ... {the piston-driving or -driven cam being provided with an inlet or an outlet }

F01B 1/0634

- ... {with two or more series radial piston-cylinder units }

F01B 1/0637

- {directly located side by side }

- F01B 1/0641 . . {Details, component parts specially adapted for such machines }
- F01B 1/0644 . . . {Pistons }
- F01B 1/0648 . . . {Cams }
- F01B 1/0651 {consisting of several cylindrical elements, e.g. rollers }
- F01B 1/0655 . . . {cylinders }
- F01B 1/0658 . . . {Arrangements for pressing or connecting the pistons against the actuating or actuated cam }
- F01B 1/0662 {hydraulically }
- F01B 1/0665 . . . {Disconnecting the pistons from the actuating or actuated cam (in general [F01B 31/24](#)) }
- F01B 1/0668 . . . {Supporting and guiding means for the piston }
- F01B 1/0672 . . . {Draining of the machinehousing; arrangements dealing with leakage fluid }
- F01B 1/0675 . . {Controlling }
- F01B 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 }
- F01B 1/0682 . . . {by changing the effective cross sectional piston working surface }
- F01B 1/0686 . . . {by changing the effective piston stroke }
- F01B 1/0689 {by changing the excentricity of one element relative to another element }
- F01B 1/0693 . . . {by changing the phase relationship between two actuating or actuated cams }
- F01B 1/0696 . . . {by changing the phase relationship between the actuating or actuated cam and the distributing means }

- F01B 1/08 . with cylinders arranged oppositely relative to main shaft and of "flat" type

- F01B 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](#))

- F01B 1/12 . Separate cylinder-crankcase elements coupled together to form a unit

- F01B 3/00** **Reciprocating-piston machines or engines with cylinder axes coaxial with, or parallel or inclined to, main shaft axis**

- F01B 3/0002 . {having stationary cylinders }
- F01B 3/0005 . . {having two or more sets of cylinders or pistons }
- F01B 3/0008 . . {having self-acting distribution members, e.g. actuated by working fluid }
- F01B 3/0011 . . . {Cylindrical distribution members }
- F01B 3/0014 . . . {Conical distribution members }
- F01B 3/0017 . . {Component parts, details, e.g. sealings, lubrication }
- F01B 3/002 . . . {Cylinders }
- F01B 3/0023 . . . {Actuating or actuated elements }
- F01B 3/0026 {Actuating or actuated element bearing means or driving or driven axis bearing means }
- F01B 3/0029 . . . {Casings, housings }

- F01B 3/0032 . {having rotary cylinder block }
- F01B 3/0035 . . {having two or more sets of cylinders or pistons }

- F01B 3/0038 . . . {inclined to main shaft axis }
- F01B 3/0041 . . {Arrangements for pressing the cylinder barrel against the valve plate, e.g. fluid pressure }
- F01B 3/0044 . . {Component parts, details, e.g. valves, sealings, lubrication }
- F01B 3/0047 . . . {Particularities in the contacting area between cylinder barrel and valve plate }
- F01B 3/005 {Bearing arrangements }
- F01B 3/0052 . . . {Cylinder barrel }
- F01B 3/0055 . . . {Valve means, e.g. valve plate }
- F01B 3/0058 {Cylindrical valve means }
- F01B 3/0061 {Conical valve means }
- F01B 3/0064 . . . {Machine housing }
- F01B 3/0067 {cylinder barrel bearing means }
- F01B 3/007 . . . {Swash plate }
- F01B 3/0073 {swash plate bearing means or driving or driven axis bearing means }
- F01B 3/0076 . . {Connection between cylinder barrel and inclined swash plate }

- F01B 3/0079 . {having pistons with rotary and reciprocating motion, i.e. spinning pistons }

- F01B 3/0082 . {Details }
- F01B 3/0085 . . {Pistons }
- F01B 3/0088 . . . {Piston shoe retaining means }
- F01B 3/0091 . . { Casings, housings }
- F01B 3/0094 . . {Driving or driven means }
- F01B 2003/0097 . . . Z-shafts, i.e. driven or driving shafts in Z-form

- F01B 3/02 . with wobble-plate

- F01B 3/04 . the piston motion being transmitted by curved surfaces
- F01B 3/045 . . {by two or more curved surfaces, e.g. for two or more pistons in one cylinder }
- F01B 3/06 . . by multi-turn helical surfaces and automatic reversal
- F01B 3/08 . . . the helices being arranged on the pistons

- F01B 3/10 . Control of working-fluid admission or discharge peculiar thereto ([suitable for more general application F01L](#))
- F01B 3/101 . . {for machines with stationary cylinders }
- F01B 3/102 . . . {Changing the piston stroke by changing the position of the swash plate }
- F01B 3/103 . . {for machines with rotary cylinder block }
- F01B 3/104 . . . {by turning the valve plate }
- F01B 3/105 . . . {by moving the swash plate in a direction perpendicular to the axis of rotation of the cylinder barrel }
- F01B 3/106 . . . {by changing the inclination of the swash plate }
- F01B 3/107 {using wedges }
- F01B 3/108 . . . {by turning the swash plate ([with fixed inclination](#)) }
- F01B 3/109 . . . {by changing the inclination of the axis of the cylinder barrel relative to the swash plate ([F01B 3/106 takes precedence](#)) }

F01B 5/00 **Reciprocating-piston machines or engines with cylinder axes arranged substantially tangentially to a circle centred on main shaft axis**

- F01B 5/003 . {the connection of the pistons with an actuated or actuating element being at the outer ends of the cylinders }
- F01B 5/006 . {the connection of the pistons with an actuated or actuating element being at the inner ends of the cylinders }

F01B 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](#))**

- F01B 7/02 . with oppositely reciprocating pistons
- F01B 7/04 . . acting on same main shaft
- F01B 7/06 . . . using only connecting-rods for conversion of reciprocatory into rotary motion or vice-versa
- F01B 7/08 with side rods
- F01B 7/10 having piston-rod of one piston passed through other piston
- F01B 7/12 . . . using rockers and connecting-rods
- F01B 7/14 . . acting on different main shafts
- F01B 7/16 . with pistons synchronously moving in tandem arrangement
- F01B 7/18 . with differential piston ([F01B 7/20](#) takes precedence)
- F01B 7/20 . with two or more pistons reciprocating one within another, e.g. one piston forming cylinder of the other

F01B 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](#))**

- F01B 9/02 . with crankshaft
- F01B 9/023 . . {of Bourke-type or Scotch yoke }
- F01B 9/026 . . {Rigid connections between piston and rod; Oscillating pistons }
- F01B 9/04 . with rotary main shaft other than crankshaft
- F01B 9/042 . . {the connections comprising gear transmissions }
- F01B 2009/045 . . . Planetary gearings
- F01B 9/047 . . {with rack and pinion }
- F01B 9/06 . . the piston motion being transmitted by curved surfaces
- F01B 2009/061 . . . by cams
- F01B 2009/063 Mono-lobe cams
- F01B 2009/065 Bi-lobe cams
- F01B 2009/066 Tri-lobe cams

- F01B 2009/068 Quadri-lobe cams
- F01B 9/08 . . with ratchet and pawl

- F01B 11/00 Reciprocating-piston machines or engines without rotary main shaft, e.g. of free-piston type**

- F01B 11/001 . {in which the movement in the two directions is obtained by one double acting piston motor }
- F01B 11/002 . . {one side of the double acting piston motor being always under the influence of the fluid under pressure }
- F01B 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 }

- F01B 11/004 . {in which the movement in the two directions is obtained by two single acting piston motors, each acting in one direction }
- F01B 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
- F01B 11/006 . . {one single acting piston motor being always under the influence of the fluid under pressure }

- F01B 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 }
- F01B 11/008 . . {with actuation in the other direction by gravity }

- F01B 11/009 . {in which the movement in two directions is obtained by two or more double acting piston motors }

- F01B 11/02 . Equalising or cushioning devices

- F01B 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)
- F01B 11/06 . . for generating vibration only

- F01B 11/08 . with direct fluid transmission link ([F01B 11/02](#) takes precedence)

- F01B 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](#))**

- F01B 13/02 . with one cylinder only

- F01B 13/04 . with more than one cylinder { ([F01B 3/0032](#) takes precedence) }
- F01B 13/045 . . {with cylinder axes arranged substantially tangentially to a circle centred on main shaft axis }

- F01B 13/06 . . in star arrangement
- F01B 13/061 . . . {the connection of the pistons with the actuated or actuating element being at the outer ends of the cylinders }
- F01B 13/062 {cylinder block and actuating or actuated cam both rotating ([F01B 13/064](#) and [F01B 13/066](#) take precedence) }

- F01B 13/063 {with two or more series radial piston-cylinder units }
- F01B 13/064 {cylinder block and actuating or actuated cam both rotating ([F01B 13/066](#) takes precedence) }
- F01B 13/065 {directly located side by side }
- F01B 13/066 {cylinder block and actuating or actuated cam both rotating }
- F01B 13/067 {with pistons and cylinders having two different parallel axis of rotation }
- F01B 13/068 . . . {the connection of the pistons with an actuated or actuating element being at the inner ends of the cylinders }

F01B 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](#))**

- F01B 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 }
- F01B 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 }
- F01B 15/007 . {having spinning cylinders, i.e. the cylinders rotating about their longitudinal axis }
- F01B 15/02 . with reciprocating cylinders ([with one piston within another \[F01B 7/20\]\(#\)](#))
- F01B 15/04 . with oscillating cylinder
- F01B 15/06 . . Control of working-fluid admission or discharge peculiar thereto
- F01B 15/065 . . . {by cam-actuated distribution members }

F01B 17/00 **Reciprocating-piston machines or engines characterised by use of uniflow principle**

- F01B 17/02 . Engines
- F01B 17/022 . . {with fluid heating }
- F01B 17/025 . . {using liquid air }
- F01B 17/027 . . {using separators }
- F01B 17/04 . . Steam engines

NOTE

- in this group the following indexing codes are used:
[F01B 2170/0411](#) to [F01B 2170/0494](#)

F01B 19/00 **Positive-displacement machines or engines of flexible-wall type**

- F01B 19/02 . with plate-like flexible members
- F01B 19/04 . with tubular flexible members

F01B 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](#))

- F01B 21/02 . the machines or engines being all of reciprocating-piston type
- F01B 21/04 . the machines or engines being not all of reciprocating-piston type, e.g. of reciprocating steam engine with steam turbine

F01B 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)

- F01B 23/02 . Adaptations for driving vehicles, e.g. locomotives ([arrangements in vehicles, see the relevant classes for vehicles](#))
- F01B 23/04 . . the vehicles being waterborne vessels
- F01B 23/06 . Adaptations for driving, or combinations with, hand-held tools or the like
- F01B 23/08 . Adaptations for driving, or combinations with, pumps
- F01B 23/10 . Adaptations for driving, or combinations with, electric generators
- F01B 23/12 . Adaptations for driving rolling mills or other heavy reversing machinery

F01B 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](#) to [F01B 2250/009](#)

- F01B 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](#))
- F01B 25/04 . . Sensing elements
- F01B 25/06 . . . responsive to speed
- F01B 25/08 . . Final actuators
- F01B 25/10 . . . Arrangements or adaptations of working-fluid admission or discharge valves ([valves in general F16K](#))
- F01B 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](#))
- F01B 25/14 . . peculiar to particular kinds of machines or engines
- F01B 25/16 . Safety means responsive to specific conditions ([against water hammer or the like in steam engines F01B 31/34](#))
- F01B 25/18 . . preventing rotation in wrong direction
- F01B 25/20 . Checking operation on safety devices

- F01B 25/22 . Braking by redirecting working-fluid
- F01B 25/24 . . thereby regenerating energy
- F01B 25/26 . Warning devices
- F01B 27/00 Starting of machines or engines (starting combustion engines [F02N](#))**
- F01B 27/02 . of reciprocating-piston engines
- F01B 27/04 . . by directing working-fluid supply, e.g. by aid of by-pass steam conduits
- F01B 27/06 . . . specially for compound engines
- F01B 27/08 . . Means for moving crank off dead-centre ([turning-gear in general F16H](#))
- F01B 29/00 Machines or engines with pertinent characteristics other than those provided for in preceding main groups**
- F01B 29/02 . Atmospheric engines, i.e. atmosphere acting against vacuum
- F01B 29/04 . characterised by means for converting from one type to a different one
- F01B 29/06 . . from steam engine into combustion engine
- F01B 29/08 . Reciprocating-piston machines or engines not otherwise provided for
- F01B 29/10 . . Engines ([refrigeration machines F25B](#))
- F01B 29/12 . . . Steam engines ([toy steam engines A63H 29/16](#))
- F01B 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](#))**
- F01B 31/005 . {[Silencing equipment \(silencing for steam engines F01B 31/16\)](#) }
- F01B 31/02 . De-icing means for engines having icing phenomena
- F01B 31/04 . Means for equalising torque in reciprocating-piston machines or engines ([compensation of inertial forces, suppression of vibration in systems F16F](#))
- F01B 31/06 . Means for compensating relative expansion of component parts
- F01B 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](#))
- F01B 31/10 . Lubricating arrangements of steam engines ([of fluid machines or engines in general F01M](#))
- F01B 31/12 . Arrangements of measuring or indicating devices ([warning apparatus F01B 25/26; measuring instruments or the like per se G01](#))
- F01B 31/14 . Changing of compression ratio
- F01B 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](#))

- [F01B 31/18](#) . Draining
- [F01B 31/20](#) . . of cylinders
- [F01B 31/22](#) . Idling devices, e.g. having by-passing valves
- [F01B 31/24](#) . . Disengagement of connections between pistons and main shafts
- [F01B 31/26](#) . Other component parts, details, or accessories, peculiar to steam engines
- [F01B 31/28](#) . . Cylinders or cylinder covers
- [F01B 31/30](#) . . Arrangements of steam conduits
- [F01B 31/32](#) . . Arrangements or adaptations of vacuum breakers
- [F01B 31/34](#) . . Safety means against water hammers or against the penetration of water ([steam traps F16T](#))
- [F01B 31/36](#) . . . automatically cutting-off steam supply

[F01B 2170/00](#) Steam engines, e.g. for locomotives or ships

- [F01B 2170/04](#) . To-be-deleted with administrative transfer to parent group
- [F01B 2170/0405](#) . . To-be-deleted with administrative transfer to parent group
- [F01B 2170/0411](#) . . . for locomotives
- [F01B 2170/0417](#) . . . for locomobiles driven by small motors
- [F01B 2170/0423](#) . . . Single acting steam engines with 1, 2 or 3 cylinders
- [F01B 2170/0429](#) . . . Double acting high pressure machines
- [F01B 2170/0435](#) . . . Compound machines with double or plural expansion; Auxiliaries driven by main engine
- [F01B 2170/0441](#) . . . Compound engines with monolytic pistons in same cylinder
- [F01B 2170/0447](#) . . . Machines with more than one piston in a cylinder and with counter moving pistons
- [F01B 2170/0452](#) . . . Engines without connecting rods
- [F01B 2170/0458](#) . . . Moving cylinders for steam engines, e.g. with telescopic cylinder arrangements
- [F01B 2170/0464](#) . . . Oscillating cylinders for steam engines
- [F01B 2170/047](#) . . . mGeneral arrangements for steam engines
- [F01B 2170/0476](#) . . . Components or parts for steam engines
- [F01B 2170/0482](#) . . . with toroidal cylinder space
- [F01B 2170/0488](#) To-be-deleted with administrative transfer to parent group
- [F01B 2170/0494](#) with fixed cylinder space

[F01B 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

- [F01B 2250/001](#) . Valves for steam inlet or outlet
- [F01B 2250/002](#) . Valves, brakes, control or safety devices for steam engines

- F01B 2250/003 . Apparatus for control or receiver or condensor pressure
- F01B 2250/004 . Devices for draining or idling of steam cylinders or for uncoupling piston and connecting rod
- F01B 2250/005 . Oil separators for steam engines
- F01B 2250/006 . Arrangement of or controlling of piston pumps or compressors without crank shaft
- F01B 2250/007 . Condensing devices for steam engines
- F01B 2250/008 . Surface condensors for so far as they influence the functioning of the engine
- F01B 2250/009 . Condensor pumps for steam engines