

CPC**COOPERATIVE PATENT CLASSIFICATION****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](#))

NOTE

1. 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.
2. 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 condensers for so far as they influence the functioning of the engine
F01B 2250/009	.	Condensor pumps for steam engines