

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

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