

ECLA**EUROPEAN 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 [F02B57/00](#), [F02B59/00](#); 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) **[M1204]**

Notes

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".

F01B1/00

Reciprocating-piston machines or engines characterised by number or relative disposition of cylinders or by being built-up from separate cylinder-crankcase elements ([F01B3/00](#), [F01B5/00](#) take precedence)

F01B1/01

- . with one single cylinder

F01B1/02

- . with cylinders all in one line

F01B1/04

- . with cylinders in V-arrangement

F01B1/06

- . with cylinders in star or fan arrangement

F01B1/06A

- . . [N: the connection of the pistons with an element being at the outer ends of the cylinders]

F01B1/06A2

- . . . [N: with cam-actuated distribution member(s)]

F01B1/06A5

- . . . [N: with two or more series radial piston-cylinder units]

F01B1/06A5B

- [N: directly located side by side]

F01B1/06A5C

- [N: coupling of several cylinders-barrels]

F01B1/06B

- . . [N: the connection of the pistons with an actuating or actuated element being at the inner ends of the cylinders]

F01B1/06B2

- . . . [N: with cam-actuated distribution member(s)]

F01B1/06B2C

- [N: 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]

F01B1/06B4

- . . . [N: the piston-driving or -driven cam being provided with an inlet or an outlet]

F01B1/06B5

- . . . [N: with two or more series radial piston-cylinder units]

F01B1/06B5B

- [N: directly located side by side]

- F01B1/06K . . [N: Details, component parts specially adapted for such machines]
- F01B1/06K2 . . . [N: Pistons]
- F01B1/06K3 . . . [N: Cams]
- F01B1/06K3B [N: consisting of several cylindrical elements, e.g. rollers]
- F01B1/06K4 . . . [N: cylinders]
- F01B1/06K5 . . . [N: Arrangements for pressing or connecting the pistons against the actuating or actuated cam]
- F01B1/06K5B [N: hydraulically]
- F01B1/06K6 . . . [N: Disconnecting the pistons from the actuating or actuated cam (in general [F01B31/24](#))]
- F01B1/06K7 . . . [N: Supporting and guiding means for the piston]
- F01B1/06K10 . . . [N: Draining of the machinehousing; arrangements dealing with leakage fluid]
- F01B1/06N . . [N: Controlling]
- F01B1/06N2 . . . [N: 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] [N0408]
- F01B1/06N4 . . . [N: by changing the effective cross sectional piston working surface] [N0408]
- F01B1/06N6 . . . [N: by changing the effective piston stroke] [N0408]
- F01B1/06N6B [N: by changing the excentricity of one element relative to another element] [N0408]
- F01B1/06N8 . . . [N: by changing the phase relationship between two actuating or actuated cams] [N0408]
- F01B1/06N10 . . . [N: by changing the phase relationship between the actuating or actuated cam and the distributing means] [N0408]

- F01B1/08 . with cylinders arranged oppositely relative to main shaft and of "flat" type

- F01B1/10 . with more than one main shaft, e.g. coupled to common output shaft (combinations of two or more machines or engines [F01B21/00](#))

- F01B1/12 . Separate cylinder-crankcase elements coupled together to form a unit

F01B3/00 Reciprocating-piston machines or engines with cylinder axes coaxial with, or parallel or inclined to, main shaft axis

- F01B3/00A . [N: having stationary cylinders]
- F01B3/00A2 . . [N: having two or more sets of cylinders or pistons]
- F01B3/00A3 . . [N: having self-acting distribution members, e.g. actuated by working fluid]
- F01B3/00A3C . . . [N: Cylindrical distribution members]
- F01B3/00A3K . . . [N: Conical distribution members]
- F01B3/00A4 . . [N: Component parts, details, e.g. sealings, lubrication]
- F01B3/00A4C . . . [N: Cylinders]
- F01B3/00A4G . . . [N: Actuating or actuated elements]
- F01B3/00A4G2 [N: Actuating or actuated element bearing means or driving or driven axis bearing means]
- F01B3/00A4H . . . [N: Casings, housings]

- F01B3/00B . [N: having rotary cylinder block]
- F01B3/00B2 . . [N: having two or more sets of cylinders or pistons]
- F01B3/00B2B . . . [N: inclined to main shaft axis]
- F01B3/00B3 . . [N: Arrangements for pressing the cylinder barrel against the valve plate, e.g. fluid pressure]
- F01B3/00B4 . . [N: Component parts, details, e.g. valves, sealings, lubrication]
- F01B3/00B4B . . . [N: Particularities in the contacting area between cylinder barrel and valve plate]
- F01B3/00B4B2 [N: Bearing arrangements]
- F01B3/00B4C . . . [N: Cylinder barrel]
- F01B3/00B4D . . . [N: Valve means, e.g. valve plate]
- F01B3/00B4D3 [N: Cylindrical valve means]
- F01B3/00B4D5 [N: Conical valve means]
- F01B3/00B4F . . . [N: Machine housing]
- F01B3/00B4F2 [N: cylinder barrel bearing means]
- F01B3/00B4G . . . [N: Swash plate]
- F01B3/00B4G2 [N: swash plate bearing means or driving or driven axis bearing means]
- F01B3/00B6 . . [N: Connection between cylinder barrel and inclined swash plate]

- F01B3/00C . [N: having pistons with rotary and reciprocating motion, i.e. spinning pistons]

- F01B3/00D . [N: Details]
- F01B3/00D3 . . [N: Pistons]
- F01B3/00D3R . . . [N: Piston shoe retaining means]
- F01B3/00D5 . . [N: Casings, housings]
- F01B3/00D7 . . [N: Driving or driven means]

- F01B3/02 . with wobble-plate

- F01B3/04 . the piston motion being transmitted by curved surfaces
- F01B3/04M . . [N: by two or more curved surfaces, e.g. for two or more pistons in one cylinder]
- F01B3/06 . . by multi-turn helical surfaces and automatic reversal
- F01B3/08 . . . the helices being arranged on the pistons

- F01B3/10 . Control of working-fluid admission or discharge peculiar thereto ([suitable for more general application F01L](#))
- F01B3/10A . . [N: for machines with stationary cylinders]
- F01B3/10A2 . . . [N: Changing the piston stroke by changing the position of the swash plate]
- F01B3/10B . . [N: for machines with rotary cylinder block]
- F01B3/10B2 . . . [N: by turning the valve plate]
- F01B3/10B3 . . . [N: by moving the swash plate in a direction perpendicular to the axis of rotation of the cylinder barrel]
- F01B3/10B4 . . . [N: by changing the inclination of the swash plate]
- F01B3/10B4B [N: using wedges]
- F01B3/10B5 . . . [N: by turning the swash plate (with fixed inclination)]

- F01B3/10B6 . . . [N: by changing the inclination of the axis of the cylinder barrel relative to the swash plate ([F01B3/10B4](#) takes precedence)]

- F01B5/00** **Reciprocating-piston machines or engines with cylinder axes arranged substantially tangentially to a circle centred on main shaft axis**

- F01B5/00A . [N: the connection of the pistons with an actuated or actuating element being at the outer ends of the cylinders]
- F01B5/00B . [N: the connection of the pistons with an actuated or actuating element being at the inner ends of the cylinders]

- F01B7/00** **Machines or engines with two or more pistons reciprocating within same cylinder or within essentially coaxial cylinders ([in opposite arrangement relative to main shaft F01B1/08](#))**

- F01B7/02 . with oppositely reciprocating pistons
- F01B7/04 . . acting on same main shaft
- F01B7/06 . . . using only connecting-rods for conversion of reciprocatory into rotary motion or vice-versa
- F01B7/08 with side rods
- F01B7/10 having piston-rod of one piston passed through other piston
- F01B7/12 . . . using rockers and connecting-rods
- F01B7/14 . . acting on different main shafts

- F01B7/16 . with pistons synchronously moving in tandem arrangement

- F01B7/18 . with differential piston ([F01B7/20](#) takes precedence)

- F01B7/20 . with two or more pistons reciprocating one within another, e.g. one piston forming cylinder of the other

- F01B9/00** **Reciprocating-piston machines or engines characterised by connections between pistons and main shafts and not specific to preceding groups ([connections disengageable during idling F01B31/24](#))**

- F01B9/02 . with crankshaft
- F01B9/02B . . [N: of Bourke-type or Scotch yoke]
- F01B9/02R . . [N: Rigid connections between piston and rod; Oscillating pistons]

- F01B9/04 . with rotary main shaft other than crankshaft
- F01B9/04G . . [N: the connections comprising gear transmissions] [N9509]
- F01B9/04R . . [N: with rack and pinion]
- F01B9/06 . . the piston motion being transmitted by curved surfaces
- F01B9/08 . . with ratchet and pawl

- F01B11/00** **Reciprocating-piston machines or engines without rotary main shaft, e.g. of free-piston type**

- F01B11/00B . [N: in which the movement in the two directions is obtained by one double acting piston motor]
- F01B11/00B2 . . [N: one side of the double acting piston motor being always under the influence of the fluid under pressure]
- F01B11/00B2B . . . [N: 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]
- F01B11/00C . [N: in which the movement in the two directions is obtained by two single acting piston motors, each acting in one direction]
- F01B11/00C2 . . [N: one single acting piston motor being always under the influence of the fluid under pressure]
- F01B11/00D . [N: 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]
- F01B11/00D2 . . [N: with actuation in the other direction by gravity]
- F01B11/00F . [N: in which the movement in two directions is obtained by two or more double acting piston motors]
- F01B11/02 . Equalising or cushioning devices
- F01B11/04 . Engines combined with reciprocatory driven devices, e.g. hammers (with pumps [F01B23/08](#); predominating aspects of driven devices, see the relevant classes for the devices)
- F01B11/06 . . for generating vibration only
- F01B11/08 . with direct fluid transmission link ([F01B11/02](#) takes precedence)
- F01B13/00** **Reciprocating-piston machines or engines with rotating cylinders in order to obtain the reciprocating-piston motion** (machines or engines of flexible-wall type [F01B19/00](#))
- F01B13/02 . with one cylinder only
- F01B13/04 . with more than one cylinder [N: ([F01B3/00B](#) takes precedence)]
- F01B13/04T . . [N: with cylinder axes arranged substantially tangentially to a circle centred on main shaft axis] [N9604]
- F01B13/06 . . in star arrangement
- F01B13/06A . . . [N: the connection of the pistons with the actuated or actuating element being at the outer ends of the cylinders]
- F01B13/06A1 [N: cylinder block and actuating or actuated cam both rotating ([F01B13/06A2A](#) and [F01B13/06A2B2](#) take precedence)]
- F01B13/06A2 [N: with two or more series radial piston-cylinder units]
- F01B13/06A2A [N: cylinder block and actuating or actuated cam both rotating ([F01B13/06A2B2](#) takes precedence)]
- F01B13/06A2B [N: directly located side by side]
- F01B13/06A2B2 [N: cylinder block and actuating or actuated cam both rotating]
- F01B13/06A4 [N: with pistons and cylinders having two different parallel axis of rotation] [N0011]

F01B13/06B . . . [N: the connection of the pistons with an actuated or actuating element being at the inner ends of the cylinders]

F01B15/00 **Reciprocating-piston machines or engines with movable cylinders other than provided for in group [F01B13/00](#) (with movable cylinder sleeves for working fluid control [F01L](#))**

F01B15/00A . [N: 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]

F01B15/00B . [N: 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]

F01B15/00C . [N: having spinning cylinders, i.e. the cylinders rotating about their longitudinal axis]

F01B15/02 . with reciprocating cylinders (with one piston within another [F01B7/20](#))

F01B15/04 . with oscillating cylinder

F01B15/06 . . Control of working-fluid admission or discharge peculiar thereto

F01B15/06B . . . [N: by cam-actuated distribution members]

F01B17/00 **Reciprocating-piston machines or engines characterised by use of uniflow principle**

F01B17/02 . Engines

F01B17/02H . . [N: with fluid heating]

F01B17/02L . . [N: using liquid air]

F01B17/02S . . [N: using separators]

F01B17/04 . . Steam engines [M1204]

[N: **Note**

- in this group the following indexing codes are used:

[R01B170/04A1](#) to [R01B170/04A20B1](#)

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F01B19/00 **Positive-displacement machines or engines of flexible-wall type**

F01B19/02 . with plate-like flexible members

F01B19/04 . with tubular flexible members

F01B21/00 **Combinations of two or more machines or engines ([F01B23/00](#) takes precedence; regulating or controlling, see the relevant groups; combinations of two or more pumps [F04](#); fluid gearing [F16H](#))**

F01B21/02 . the machines or engines being all of reciprocating-piston type

F01B21/04 . the machines or engines being not all of reciprocating-piston type, e.g. of reciprocating steam engine with steam turbine

- F01B23/00** **Adaptations of machines or engines for special use; Combinations of engines with devices driven thereby** ([F01B11/00](#) takes precedence; fluid gearing [F16H](#); aspects predominantly concerning driven devices, see the relevant classes for these devices; regulating or controlling, see the relevant groups)
- [F01B23/02](#) . Adaptations for driving vehicles, e.g. locomotives (arrangements in vehicles, see the relevant classes for vehicles)
- [F01B23/04](#) . . the vehicles being waterborne vessels
- [F01B23/06](#) . Adaptations for driving, or combinations with, hand-held tools or the like
- [F01B23/08](#) . Adaptations for driving, or combinations with, pumps
- [F01B23/10](#) . Adaptations for driving, or combinations with, electric generators
- [F01B23/12](#) . Adaptations for driving rolling mills or other heavy reversing machinery
- F01B25/00** **Regulating, controlling, or safety means (regulating or controlling in general G05) [M1205]**
- [N: **Note**
- in this group the following indexing codes are used:
[R01B250/00G1](#) to [R01B250/00G14](#)
]
- [F01B25/02](#) . Regulating or controlling by varying working-fluid admission or exhaust, e.g. by varying pressure or quantity ([distributing or expansion valve gear F01L](#))
- [F01B25/04](#) . . Sensing elements
- [F01B25/06](#) . . . responsive to speed
- [F01B25/08](#) . . Final actuators
- [F01B25/10](#) . . . Arrangements or adaptations of working-fluid admission or discharge valves ([valves in general F16K](#))
- [F01B25/12](#) . . Devices dealing with sensing elements or final actuators or transmitting means between them, e.g. power-assisted ([sensing elements alone F01B25/04](#); [final actuators alone F01B25/08](#))
- [F01B25/14](#) . . peculiar to particular kinds of machines or engines
- [F01B25/16](#) . Safety means responsive to specific conditions ([against water hammer or the like in steam engines F01B31/34](#))
- [F01B25/18](#) . . preventing rotation in wrong direction
- [F01B25/20](#) . Checking operation on safety devices
- [F01B25/22](#) . Braking by redirecting working-fluid
- [F01B25/24](#) . . thereby regenerating energy
- [F01B25/26](#) . Warning devices
- F01B27/00** **Starting of machines or engines** ([starting combustion engines F02N](#))

- F01B27/02 . of reciprocating-piston engines
- F01B27/04 . . by directing working-fluid supply, e.g. by aid of by-pass steam conduits
- F01B27/06 . . . specially for compound engines
- F01B27/08 . . Means for moving crank off dead-centre ([turning-gear in general F16H](#))

- F01B29/00** **Machines or engines with pertinent characteristics other than those provided for in preceding main groups**

- F01B29/02 . Atmospheric engines, i.e. atmosphere acting against vacuum
- F01B29/04 . characterised by means for converting from one type to a different one
- F01B29/06 . . from steam engine into combustion engine

- F01B29/08 . Reciprocating-piston machines or engines not otherwise provided for
- F01B29/10 . . Engines ([refrigeration machines F25B](#))
- F01B29/12 . . . Steam engines ([toy steam engines A63H29/16](#)) [C9809]

- F01B31/00** **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)**

- F01B31/00S . [N: [Silencing equipment \(silencing for steam engines F01B31/16\)](#)]
- F01B31/02 . De-icing means for engines having icing phenomena
- F01B31/04 . Means for equalising torque in reciprocating-piston machines or engines ([compensation of inertial forces, suppression of vibration in systems F16F](#))
- F01B31/06 . Means for compensating relative expansion of component parts
- F01B31/08 . Cooling of steam engines ([cooling of fluid machines or engines in general F01P](#)); Heating; Heat insulation ([heat insulation in general F16L59/00](#))
- F01B31/10 . Lubricating arrangements of steam engines ([of fluid machines or engines in general F01M](#))
- F01B31/12 . Arrangements of measuring or indicating devices ([warning apparatus F01B25/26; measuring instruments or the like per se G01](#))
- F01B31/14 . Changing of compression ratio
- F01B31/16 . Silencers specially adapted for steam engines ([arrangements of exhaust pipes or tubes on steam engines F01B31/30; gas-flow silencers or exhaust silencers for machines or engines in general F01N](#))
- F01B31/18 . Draining
- F01B31/20 . . of cylinders
- F01B31/22 . Idling devices, e.g. having by-passing valves

- F01B31/24 . . Disengagement of connections between pistons and main shafts
- F01B31/26 . Other component parts, details, or accessories, peculiar to steam engines
- F01B31/28 . . Cylinders or cylinder covers
- F01B31/30 . . Arrangements of steam conduits
- F01B31/32 . . Arrangements or adaptations of vacuum breakers
- F01B31/34 . . Safety means against water hammers or against the penetration of water ([steam traps F16I](#))
- F01B31/36 . . . automatically cutting-off steam supply