

SECTION F – MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING

F01 MACHINES OR ENGINES IN GENERAL (combustion engines F02; machines for liquids F03, F04); 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 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)

- (1) 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.
- (2) Attention is drawn to the Notes preceding class F01, especially as regards the definitions of “steam” and “special vapour”.

MACHINES OR ENGINES

With reciprocating pistons
characterised by

- number or relative disposition
of cylinders..... 1/00
- disposition of cylinder axes
relative to main shaft..... 3/00, 5/00
- pistons reciprocating in same
or coaxial cylinders; piston-
main-shaft connections other
than covered above 7/00, 1/08;
9/00
- no rotary main shaft 11/00

rotary or other movement of

- cylinders 13/00, 15/00
- uniflow principle 17/00

With positive displacement of

- flexible-wall type 19/00

- COMBINATIONS OR ADAPTATIONS OF
MACHINES OR ENGINES..... 21/00, 23/00
- REGULATING, CONTROLLING, SAFETY
MEANS; STARTING 25/00; 27/00
- OTHER CHARACTERISTICS; DETAILS,
ACCESSORIES 29/00; 31/00

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) [2]

- 1/01 . with one single cylinder [2]
- 1/02 . with cylinders all in one line
- 1/04 . with cylinders in V-arrangement
- 1/06 . with cylinders in star or fan arrangement
- 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 (combinations of two or more machines or engines F01B 21/00)
- 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

- 3/02 . with wobble-plate
- 3/04 . the piston motion being transmitted by curved surfaces
- 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 (suitable for more general application F01L)

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

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

F01B

- 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 and not specific to groups F01B 1/00 F01B 7/00** (connections disengageable during idling F01B 31/24)
 - 9/02 . with crankshaft
 - 9/04 . with rotary main shaft other than crankshaft
 - 9/06 . . the piston motion being transmitted by curved surfaces
 - 9/08 . . with ratchet and pawl
- 11/00 Reciprocating-piston machines or engines without rotary main shaft, e.g. of free-piston type**
 - 11/02 . Equalising or cushioning devices
 - 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)
 - 11/06 . . for generating vibration only
 - 11/08 . with direct fluid transmission link (F01B 11/02 takes precedence)
- 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) [2]
 - 13/02 . with one cylinder only
 - 13/04 . with more than one cylinder
 - 13/06 . . in star arrangement
- 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)
 - 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
- 17/00 Reciprocating-piston machines or engines characterised by use of uniflow principle**
 - 17/02 . Engines
 - 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; combinations of two or more pumps F04; fluid gearing F16H; regulating or controlling, see the relevant groups)
 - 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** (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)
 - 23/02 . Adaptations for driving vehicles, e.g. locomotives (arrangements in vehicles, see the relevant classes for vehicles)
 - 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** (regulating or controlling in general G05)
 - 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)
 - 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 (valves in general F16K)
 - 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)
 - 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 of 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 (turning-gear in general F16H)
- 29/00 Machines or engines with pertinent characteristics other than those provided for in main groups F01B 1/00 F01B 27/00**
 - 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 (refrigeration machines F25B)
 - 29/12 . . . Steam engines (toy steam engines A63H 25/00)

- 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)
- 31/02 . De-icing means for engines having icing phenomena
 - 31/04 . Means for equalising torque in reciprocating-piston machines or engines (compensation of inertial forces, suppression of vibration in systems F16F)
 - 31/06 . Means for compensating relative expansion of component parts
 - 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)
 - 31/10 . Lubricating arrangements of steam engines (of fluid machines or engines in general F01M)
 - 31/12 . Arrangements of measuring or indicating devices (warning apparatus F01B 25/26; measuring instruments or the like per se G01)
 - 31/14 . Changing of compression ratio
 - 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)
 - 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 (steam traps F16T)
 - 31/36 . . . automatically cutting-off steam supply