

ECLA**EUROPEAN CLASSIFICATION****F01L****CYCLICALLY OPERATING VALVES FOR MACHINES OR ENGINES
(valves in general F16K)****Notes**[\[C1202\]](#)

1. Groups [F01L1/00](#) to [F01L13/00](#) cover only valve-gear or valve arrangements without provision for variable fluid distribution.
2. Valve gear or valve arrangements specially adapted for steam engines are covered by groups [F01L15/00](#) to [F01L35/00](#).
3. Valve-gear arrangements specially adapted for machines or engines with variable working-fluid distribution are covered by groups [F01L15/00](#) to [F01L35/00](#).
4. Attention is drawn to the notes preceding class F01, especially Note (3).
5. As regards the above-mentioned Note (3), attention is drawn to [F01B3/10](#), [F01B15/06](#), [F01C21/12](#), [F02B53/06](#), [F03C1/08](#), [F04B1/18](#), [F04B7/00](#), [F04B39/08](#), [F04B39/10](#), and [F04C15/02](#), [F04C29/08](#).

Guide heading:

Valve-gear for internal combustion piston engines or for other machines or engines with positive working-fluid displacement ([valve gear specially for steam engines or specially for other machines or engines with variable fluid distribution F01L15/00 to F01L35/00](#))

F01L1/00

Valve-gear or valve arrangements, e.g. lift-valve gear (lift-valve and valve-seat assemblies per se [F01L3/00](#); slide-valve gear [F01L5/00](#); actuated non-mechanically [F01L9/00](#); valve arrangements in working piston or piston rod [F01L11/00](#); modifications of valve-gear to facilitate reversing, braking, starting, changing compression ratio, or other specific operations [F01L13/00](#))

- F01L1/02 . Valve drive ([transmitting-gear between valve drive and valve F01L1/12](#))
- F01L1/02A . . [\[N: Chain drive\] \[N1207\]](#)
- F01L1/02B . . [\[N: Belt drive\] \[N1207\]](#)
- F01L1/02C . . [\[N: Gear drive\] \[N1207\]](#)
- F01L1/04 . . by means of cams, camshafts, cam discs, eccentrics or the like ([F01L1/10 takes precedence](#))
- F01L1/04F . . . [\[N: Cam discs\]](#)
- F01L1/04H . . . [\[N: Reciprocating cams\]](#)
- F01L1/047 . . . Camshafts [\[N9602\]](#)
- F01L1/053 overhead type [\[N9602\]](#)
- F01L1/053B [\[N: the cams being directly in contact with the driven valve\] \[N9602\]](#)
- F01L1/06 . . . the cams, or the like, rotating at a higher speed than that corresponding to the valve cycle, e.g. operating fourstroke engine valves directly from crankshaft
- F01L1/08 . . . Shape of cams
- F01L1/10 . . by means of crank-or eccentric-driven rods [\[N: \(F01L1/04H takes precedence\)\]](#)
- F01L1/12 . Transmitting gear between valve drive and valve ([simultaneously operating two or more valves F01L1/26](#))
- F01L1/14 . . Tappets [\[N: \(hydraulic tappets for automatically adjusting or compensating clearance F01L1/24B\)\]](#); Push rods

- F01L1/14B . . . [N: for use with overhead camshafts]
- F01L1/14D . . . [N: Push-rods]
- F01L1/16 . . . Silencing impact; Reducing wear
- F01L1/18 . . . Rocking arms or levers
- F01L1/18B . . . [N: Centre pivot rocking arms]
- F01L1/18B2 [N: the rocking arm being pivoted about an individual fulcrum, i.e. not about a common shaft]
- F01L1/18B2B [N: of the boat type]
- F01L1/18D . . . [N: Overhead end-pivot rocking arms]

- F01L1/20 . . . Adjusting or compensating clearance
- F01L1/20B . . . [N: by means of shims or the like] [N9606]
- F01L1/22 . . . automatically, e.g. mechanically
- F01L1/24 by fluid means, e.g. hydraulically
- F01L1/24C [N: by means of a hydraulic adjusting device located between the cylinder head and rocker arm]
- F01L1/24D [N: by means of a hydraulic adjusting device located between the valve stem and rocker arm]
- F01L1/24E [N: by means of a hydraulic adjusting device attached to an articulated rocker]
- F01L1/24F [N: by means of a hydraulic adjusting device located between the push rod and rocker arm]
- F01L1/245 Hydraulic tappets [N0312]
- F01L1/25 between cam and valve stem [N0312]
- F01L1/25B [N: for side-valve engines] [N0312]
- F01L1/255 between cam and rocker arm [N0312]

- F01L1/26 . . . characterised by the provision of two or more valves operated simultaneously by same transmitting-gear; peculiar to machines or engines with more than two lift-valves per cylinder (with coaxial valves [F01L1/28](#))
- F01L1/26A . . . [N: with valve stems disposed radially from a centre which is substantially the centre of curvature of the upper wall surface of a combustion chamber ([F01L1/26B](#) takes precedence)] [N9708] [C9804]
- F01L1/26B . . . [N: peculiar to machines or engines with three or more intake valves per cylinder]
- F01L1/26D . . . [N: with means for varying the timing or the lift of the valves]

- F01L1/28 . . . characterised by the provision of coaxial valves; characterised by the provision of valves co-operating with both intake and exhaust ports
- F01L1/28B . . . [N: Coaxial intake and exhaust valves]

- F01L1/30 . . . characterised by the provision of positively opened and closed valves, i.e. desmodromic valves

- F01L1/32 . . . characterised by the provision of means for rotating lift valves, e.g. to diminish wear

- F01L1/34 . . . characterised by the provision of means for changing the timing of the valves without changing the duration of opening [N: and without affecting the magnitude of the valve lift]

- F01L1/344 . . . changing the angular relationship between crankshaft and camshaft, e.g. using helicoidal gear
- F01L1/344A . . . [N: using helically teathed sleeve or gear moving axially between crankshaft and camshaft]
- F01L1/344A1 [N: the helically teathed sleeve being located in the camshaft driving pulley] [C9608]
- F01L1/344B . . . [N: by torque-responsive means]
- F01L1/344C . . . [N: using composite camshafts, e.g. with cams being able to move relative to the camshaft]
- F01L1/344D . . . [N: using twisted cams]
- F01L1/344E . . . [N: using hydraulic chambers with variable volume to transmit the rotating force] [N9809]
- F01L1/348 . . . by means acting on timing belts or chains
- F01L1/352 . . . using bevel or epicyclic gear
- F01L1/356 . . . making the angular relationship oscillate, [N: e.g. non-homokinetic drive]
- F01L1/36 . . . peculiar to machines or engines of specific type other than four-stroke cycle
- F01L1/38 . . . for engines with other than four-stroke cycle, e.g. with two-stroke cycle ([F01L1/26](#), [F01L1/28](#) take precedence)
- F01L1/40 . . . for engines with scavenging charge near top dead centre position, e.g. by overlapping inlet and exhaust time ([scavenging aspects F02B](#))
- F01L1/42 . . . for machines or engines characterised by cylinder arrangements, e.g. star or fan
- F01L1/44 . . . Multiple-valve gear or arrangements, not provided for in preceding subgroups, e.g. with lift and different valves
- F01L1/44A . . . [N: comprising a lift valve and at least one rotary valve] [N9502]
- F01L1/44B . . . [N: comprising a lift valve and at least one reed valve] [N9502]
- F01L1/46 . . . Component parts, details, or accessories, not provided for in preceding subgroups
- F01L1/46B . . . [N: Valve return spring arrangements] [N9409]
- F01L1/46B2 [N: Pneumatic arrangements] [N9409]
- F01L3/00** **Lift-valve, i.e. cut-off apparatus with closure members having at least a component of their opening and closing motion perpendicular to the closing faces; Parts or accessories thereof**
- F01L3/02 . . . Selecting particular materials for valve-members or valve-seats; Valve-members or valve-seats composed of two or more materials
- F01L3/04 . . . Coated valve members or valve-seats
- F01L3/06 . . . Valve members or valve-seats with means for guiding or deflecting the medium controlled thereby, e.g. producing a rotary motion of the drawn-in cylinder charge ([for rotating lift-valves F01L1/32](#))
- F01L3/08 . . . Valves guides; Sealing of valve stem, e.g. sealing by lubricant
- F01L3/08B . . . [N: Valve cages]
- F01L3/10 . . . Connecting springs to valve members

- F01L3/12 . Cooling of valves
- F01L3/14 . . by means of a liquid or solid coolant, e.g. sodium, in a closed chamber in a valve
- F01L3/16 . . by means of a fluid flowing through or along valve, e.g. air (for sealing only [F01L3/08](#))
- F01L3/18 . . . Liquid cooling of valve
- F01L3/20 . Shapes or constructions of valve members, not provided for in preceding subgroups of this group
- F01L3/20B . . [N: Reed valves]
- F01L3/22 . Valve-seats not provided for in preceding subgroups of this group; Fixing of valve-seats
- F01L3/24 . Safety means or accessories, not provided for in preceding sub- groups of this group
- F01L5/00** **Slide valve-gear or valve-arrangements (with pure rotary or oscillatory movement [F01L7/00](#))**
- F01L5/02 . with other than cylindrical, sleeve or part annularly shaped valves e.g. with flat-type valves
- F01L5/04 . with cylindrical, sleeve, or part-annularly shaped valves
- F01L5/04B . . [N: Piston-type or cylinder-type valves arranged above the piston and coaxial with the cylinder axis]
- F01L5/06 . . surrounding working cylinder or piston
- F01L5/08 . . . Arrangements with several movements or several valves, e.g. one valve inside the other (with part-annularly shaped valves [F01L5/12](#))
- F01L5/10 with reciprocating and other movements of the same valve
- F01L5/12 . . . Arrangements with part-annularly-shaped valves
- F01L5/14 . characterised by the provision of valves with reciprocating and other movements (surrounding working cylinder or piston [F01L5/06](#))
- F01L5/16 . . with reciprocating and other movement of same valve, e.g. longitudinally of working cylinder and in cross direction
- F01L5/18 . . with reciprocatory valve and other slide valve
- F01L5/20 . specially for two-stroke engines ([F01L5/06](#) and [F01L5/14](#) take precedence)
- F01L5/22 . Multiple-valve arrangements (with valves surrounding working cylinder or piston [F01L5/06](#); with reciprocatory and other slide valves [F01L5/18](#); specially for two-stroke engines [F01L5/20](#))
- F01L5/24 . Component parts, details or accessories, not provided for in preceding subgroups in this group
- F01L7/00** **Rotary or oscillatory slide valve-gear or valve arrangements (slide valves with combined rotary and non-rotary movements, combinations of rotary and non-rotary slide valves [F01L5/00](#))**
- F01L7/02 . with cylindrical, sleeve, or part-annularly shaped valves (of disc type [F01L7/06](#); of

conical type [F01L7/08](#))

- F01L7/02A . . [N: with one rotary valve]
- F01L7/02A1 . . . [N: Cylindrical valves having one recess communicating successively with aligned inlet and exhaust ports]
- F01L7/02A2 . . . [N: Cylindrical valves having a hollow or partly hollow body allowing axial inlet or exhaust fluid circulation] [N9501]
- F01L7/02A3 . . . [N: Cylindrical valves comprising radial inlet and axial outlet or axial inlet and radial outlet] [N9501]
- F01L7/02A4 . . . [N: Cylindrical valves comprising radial inlet and side outlet or side inlet and radial outlet] [N9501]
- F01L7/02B . . [N: with two or more rotary valves, their rotational axes being parallel, e.g. 4-stroke]
- F01L7/02C . . [N: with two or more valves arranged coaxially ([F01L7/04B](#) takes precedence)]
- F01L7/02D . . [N: having the rotational axis coaxial with the cylinder axis and the valve surface not surrounding piston or cylinder]
- F01L7/02E . . [N: having the rotational axis of the valve parallel to the cylinder axis]
- F01L7/04 . . Surrounding working cylinder or piston
- F01L7/04B . . . [N: with two or more valves arranged coaxially]
- F01L7/06 . with disc type valves
- F01L7/08 . with conically or frusto-conically shaped valves
- F01L7/10 . with valves of other specific shape, e.g. spherical
- F01L7/12 . specially for two-stroke engines ([F01L7/04](#) takes precedence)
- F01L7/14 . Multiple-valve arrangements (with valves surrounding working cylinder or piston [F01L7/04](#); specially for two-stroke engines [F01L7/12](#))
- F01L7/16 . Sealing or packing arrangements specially therefor
- F01L7/18 . Component parts, details, or accessories not provided for in preceding sub-groups of this group

F01L9/00 Valve-gear or valve arrangements actuated non-mechanically

- F01L9/02 . by fluid means, e.g. hydraulic
- F01L9/02B . . [N: the action of a cam being transmitted to a valve by a fluid column, e.g. a fluid conduit]
- F01L9/02B2 . . . [N: Hydraulic lifters, i.e. fluid chamber comprised between a piston actuated by a cam and a piston acting on a valve stem]
- F01L9/02B2B [N: the volume of the chamber being variable, e.g. for varying the lift or the timing of a valve]
- F01L9/02D . . [N: Pneumatic]
- F01L9/04 . by electric means

F01L11/00 Valve arrangements in working piston or piston-rod

- F01L11/02 . in piston
- F01L11/04 . . operated by movement of connecting-rod
- F01L11/06 . . . operating oscillatory valve

- F01L13/00** **Modifications of valve-gear to facilitate reversing, braking, starting, changing compression ratio, or other specific operations**

- F01L13/00B . [N: Deactivating valves]

- F01L13/00D . [N: for optimising engine performances by modifying valve lift according to various working parameters, e.g. rotational speed, load, torque]
- F01L13/00D2 . . [N: by modification of rocker arm ratio]
- F01L13/00D2E . . . [N: by means of an eccentric]
- F01L13/00D4 . . [N: by modification of tappet or pushrod length]
- F01L13/00D6 . . [N: the valves being driven by two or more cams with different shape, size or timing or a single cam profiled in axial and radial direction] [C9812]
- F01L13/00D6B . . . [N: with cams being profiled in axial and radial direction] [N9812]
- F01L13/00D6E . . . [N: the movement of the valves resulting from the sum of the simultaneous actions of at least two cams, the cams being independently variable in phase in respect of each other] [N9505]

- F01L13/00D8 . . [N: by splittable or deformable cams]
- F01L13/00D10 . . [N: by modification of cam contact point by displacing an intermediate lever or wedge-shaped intermediate element, e.g. Tourtelot]

- F01L13/02 . for reversing

- F01L13/04 . for starting by means of fluid pressure

- F01L13/06 . for braking
- F01L13/06B . . [N: Compression release engine retarders of the "Jacobs Manufacturing" type]

- F01L13/08 . for decompression, e.g. during starting; for changing compression ratio
- F01L13/08B . . [N: the valve-gear having an auxiliary cam protruding from the main cam profile] [N9502]

Guide heading: **Valve-gear or valve arrangements, e.g. with reciprocatory slide valves, specially for steam engine, or specially for other machines or engines with variable working-fluid distribution**

Note

The groups under this guide heading do not fully embrace subject matter restricted to rotary, oscillatory, or lift-valve-gear or valve arrangements, classified in groups [F01L33/00](#) and [F01L35/00](#). However, the present groups do embrace the following subject-matter thereof; valves drives or means external to valves for adjustment during operation, tripping-gear, reversing-gear, use of pistons or piston-rods as valves or as valve-supporting elements, valve-gear or valve arrangements peculiar to free-piston machines or engines

F01L15/00 **Valve-gear or valve arrangements, e.g. with reciprocatory slide valves, other than provided for in groups [F01L17/00](#) to [F01L29/00](#) (valve drive or external**

ent during operation, see the relevant groups, e.g. [F01L31/00](#); tripping-gear or tripping of valves [F01L31/00](#))

- [F01L15/02](#) . with valves other than cylindrical, sleeve, or part-annularly-shaped, e.g. flat D-valves
- [F01L15/04](#) . . main valve being combined with auxiliary valve (of drag valve type [F01L15/10](#))
- [F01L15/06](#) . . . of Meyer or Rider type, i.e. in which the expansion is varied at the expansion valve itself

- [F01L15/08](#) . with cylindrical, sleeve, or part-annularly-shaped valves; Such main valves combined with auxiliary valves

- [F01L15/10](#) . with main slide valve and auxiliary valve dragged thereby

- [F01L15/12](#) . characterised by having means for effecting pressure equilibrium between two different cylinder spaces at idling

- [F01L15/14](#) . Arrangements with several co-operating main valves, e.g. reciprocatory and rotary
- [F01L15/16](#) . . with reciprocatory slide valves only

- [F01L15/18](#) . Valves arrangements not provided for in preceding sub-groups of this main group

- [F01L15/20](#) . Component parts, details, or accessories, not provided for in preceding sub-groups of this main group

- [F01L17/00](#) **Slide valve-gear or valve arrangements with cylindrical, sleeve, or part annularly-shaped valves surrounding working cylinder or piston**

- [F01L17/02](#) . Drive or adjustment during operation, peculiar thereto, e.g. for reciprocating and oscillating movements or for several valves one inside the other

- [F01L19/00](#) **Slide valve-gear or valve arrangements with reciprocatory and other movement of same valve, other than provided for in [F01L17/00](#), e.g. longitudinally of working cylinder and in cross direction**

- [F01L19/02](#) . Drive or adjustment during operation, peculiar thereto

- [F01L21/00](#) **Use of working pistons or pistons-rods as fluid-distributing valves or a valve-supporting elements, e.g. in free-piston machines**

- [F01L21/02](#) . Piston or piston-rod used as valve members [N: [F01L25/06H](#) takes precedence]

- [F01L21/04](#) . Valves arranged in or on piston or piston-rod

- [F01L23/00](#) **Valves controlled by impact by piston, e.g. in free-piston machines; [N: [F01L25/06B](#) takes precedence]**

- [F01L25/00](#) **Drive, or adjustment during the operation, or distribution or expansion valves by non-mechanical means**

- F01L25/02 . by fluid means
- F01L25/04 . . by working-fluid of machine or engine, e.g. free-piston machine
- F01L25/06 . . . Arrangement with main and auxiliary valves, at least one of them being fluid-driven
- F01L25/06B [N: the auxiliary valve being actuated by the working motor-piston or piston-rod]
- F01L25/06H [N: piston or piston-rod being used as auxiliary valve]
- F01L25/08 . by electric or magnetic means

- F01L27/00** **Distribution or expansion valve-gear peculiar to free-piston machines or engines and not provided for in [F01L21/00](#) to [F01L25/00](#)**

- F01L27/02 . the machine or engine having rotary or oscillatory valves
- F01L27/04 . Delayed-action controls, e.g. of cataract or dashpot type

- F01L29/00** **Reversing gear (equally usable for control of degree of working-fluid admission and reversing being of secondary-importance [F01L31/00](#))**

- F01L29/02 . by displacing eccentric
- F01L29/04 . by links or guide rods
- F01L29/06 . by interchanging inlet and exhaust ports
- F01L29/08 . specially for rotary or oscillatory valves
- F01L29/10 . Details, e.g. drive
- F01L29/12 . . Powered reverse gear

- F01L31/00** **Valve drive, valve adjustment during operation, or other valve control, not provided for in groups [F01L15/00](#) to [F01L29/00](#) (sensing elements measuring the variable or condition to be controlled or regulated [F01B](#))**

- F01L31/02 . with tripping-gear (for oscillatory valves [F01L31/06](#)); Tripping of valves
- F01L31/04 . . with positively-driven trip levers

- F01L31/06 . with tripping-gear specially for oscillatory valves; Oscillatory tripping-valves, e.g. of Corliss type

- F01L31/08 . Valve drive or valve adjustment, apart from tripping aspects; Positively-driven gear
- F01L31/10 . . the drive being effected by eccentrics ([F01L31/14](#) takes precedence)
- F01L31/12 . . . Valve adjustment by displacing eccentric
- F01L31/14 . . Valve adjustment by links or guide rods, e.g. in valve-gear with eccentric drive
- F01L31/16 . . the drive being effected by specific means other than eccentric, e.g. cams; Valve adjustment in connection with such drives

F01L31/18 . . specially for rotary or oscillatory valves

Guide heading: **Rotary or oscillatory slide valve-gear or lift-valve-gear or such valve arrangements specially for steam engines or specially for other machines or engines with variable working-fluid distribution** ([drive adjustment during operation](#), [tripping-gear](#), [reversing-gear](#), [use of working pistons or piston-rods as valves or as valves-supporting elements](#), [valve-gear or valve arrangements peculiar to free-piston machines or engines F01L15/00 to F01L31/00](#))

F01L33/00 **Rotary or oscillatory slide valve-gear or valve arrangements, specially adapted for machines or engines with variable fluid distribution** ([drive](#), [adjustment during operation](#), [tripping-gear](#), [reversing-gear](#), [use of working pistons or piston-rods as valves or as valve-supporting elements](#), [valve-gear or valve arrangements peculiar to free-piston machines or engines F01L15/00 to F01L31/00](#)) [C0904]

F01L33/02 . rotary

F01L33/04 . oscillatory

F01L35/00 **Lift valve-gear or valve arrangements specially adapted for machines or engines with variable fluid distribution** ([drive](#), [adjustment during operation](#), [tripping-gear](#), [reversing-gear](#), [use of working pistons or piston-rods as valves or as valve-supporting elements](#), [valve-gear or valve arrangements peculiar to free-piston machines or engines F01L15/00 to F01L31/00](#)) [C0904]

F01L35/02 . Valves

F01L35/04 . Arrangements of valves in the machine or engine, e.g. relative to working cylinder