

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

F01 MACHINES OR ENGINES IN GENERAL; ENGINE PLANTS IN GENERAL; STEAM ENGINES

F01L CYCLICALLY OPERATING VALVES FOR MACHINES OR ENGINES (valves in general F16K)

Note(s) [2009.01]

1. Groups F01L 1/00-F01L 13/00 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 F01L 15/00-F01L 35/00.
3. Valve-gear or valve arrangements specially adapted for machines or engines with variable working-fluid distribution are covered by groups F01L 15/00-F01L 35/00.
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 F01B 3/10, F01B 15/06, F01C 20/20, F01C 21/18, F02B 53/06, F03C 1/08, F04B 1/18, F04B 7/00, F04B 39/08, F04B 39/10, F04C 14/00, F04C 15/06, F04C 28/00 and F04C 29/12.

Subclass index

VALVE-GEAR OR VALVE ARRANGEMENTS IN GENERAL

General features.....	1/00
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mechanical.....	1/00
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Lift valves.....	3/00
Slide valves.....	5/00, 7/00
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VALVE-GEAR OR VALVE ARRANGEMENTS FOR VARIABLE WORKING-FLUID DISTRIBUTION

General features.....	1/00
With slide valves	
surrounding cylinder or piston.....	17/00
with rotary or oscillatory motion; combined.....	33/00, 19/00
other features.....	15/00
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Arrangements with particular characteristics; reversing gear.....	21/00-27/00, 29/00
Other valve-gear or valve arrangements.....	15/00
Drive, control, or adjustment.....	25/00, 31/00

Valve-gear or valve arrangements for positive-displacement machines or engines other than steam engines, e.g. for internal-combustion piston engines, without provision for variable fluid distribution

- 1/00** Valve-gear or valve arrangements, e.g. lift-valve gear (lift valve and valve seat assemblies per se F01L 3/00; slide-valve gear F01L 5/00; actuated non-mechanically F01L 9/00; valve arrangements in working piston or piston-rod F01L 11/00; modifications of valve-gear to facilitate reversing, braking, starting, changing compression ratio, or other specific operations F01L 13/00) [1, 2006.01]
- 1/02 • Valve drive (transmitting-gear between valve drive and valve F01L 1/12) [1, 2006.01]
- 1/04 • • by means of cams, camshafts, cam discs, eccentrics, or the like (F01L 1/10 takes precedence) [1, 2006.01]

- 1/047 • • • Camshafts [6, 2006.01]
- 1/053 • • • • overhead type [6, 2006.01]
- 1/06 • • • the cams, or the like, rotating at a higher speed than that corresponding to the valve cycle, e.g. operating four-stroke engine valves directly from crankshaft [1, 2006.01]
- 1/08 • • • Shape of cams [1, 2006.01]
- 1/10 • • by means of crank- or eccentric-driven rods [1, 2006.01]
- 1/12 • Transmitting-gear between valve drive and valve (simultaneously operating two or more valves F01L 1/26) [1, 2006.01]
- 1/14 • • Tappets; Push-rods [1, 2006.01]
- 1/16 • • • Silencing impact; Reducing wear [1, 2006.01]
- 1/18 • • Rocking arms or levers [1, 2006.01]
- 1/20 • Adjusting or compensating clearance, i.e. lash adjustment [1, 2006.01]

- 1/22 • • automatically [1, 2006.01]
- 1/24 • • • by fluid means, e.g. hydraulically [1, 2006.01]
- 1/245 • • • • Hydraulic tappets [6, 2006.01]
- 1/25 • • • • • between cam and valve stem [6, 2006.01]
- 1/255 • • • • • between cam and rocker arm [6, 2006.01]
- 1/26 • 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 F01L 1/28) [1, 2006.01]
- 1/28 • characterised by the provision of coaxial valves; characterised by the provision of valves co-operating with both intake and exhaust ports [1, 2006.01]
- 1/30 • characterised by the provision of positively opened and closed valves, i.e. desmodromic valves [1, 2006.01]
- 1/32 • characterised by the provision of means for rotating lift valves, e.g. to diminish wear [1, 2006.01]
- 1/34 • characterised by the provision of means for changing the timing of the valves without changing the duration of opening [1, 2006.01]
- 1/344 • • changing the angular relationship between crankshaft and camshaft, e.g. using helicoidal gear [6, 2006.01]
- 1/348 • • • by means acting on timing belts or chains [6, 2006.01]
- 1/352 • • • using bevel or epicyclic gear [6, 2006.01]
- 1/356 • • • making the angular relationship oscillate [6, 2006.01]
- 1/36 • peculiar to machines or engines of specific type other than four-stroke cycle [1, 2006.01]
- 1/38 • • for engines with other than four-stroke cycle, e.g. with two-stroke cycle (F01L 1/26, F01L 1/28 take precedence) [1, 2006.01]
- 1/40 • • for engines with scavenging charge near top dead-centre position, e.g. by overlapping inlet and exhaust time (scavenging aspects F02B) [1, 2006.01]
- 1/42 • • for machines or engines characterised by cylinder arrangement, e.g. star or fan [1, 2006.01]
- 1/44 • Multiple-valve gear or arrangements, not provided for in preceding subgroups, e.g. with lift and different valves [1, 2006.01]
- 1/46 • Component parts, details, or accessories, not provided for in preceding subgroups [1, 2006.01]
- 3/00 Lift valves, 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 [1, 2006.01]**
- 3/02 • Selecting particular materials for valve members or valve seats; Valve members or valve seats composed of two or more materials [1, 2006.01]
- 3/04 • • Coated valve members or valve seats [1, 2006.01]
- 3/06 • 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 F01L 1/32) [1, 2006.01]
- 3/08 • Valve guides; Sealing of valve stem, e.g. sealing by lubricant [1, 2006.01]
- 3/10 • Connecting springs to valve members [1, 2006.01]
- 3/12 • Cooling of valves [1, 2006.01]
- 3/14 • • by means of a liquid or solid coolant, e.g. sodium, in a closed chamber in a valve [1, 2006.01]
- 3/16 • • • by means of a fluid flowing through or along valve, e.g. air (for sealing only F01L 3/08) [1, 2006.01]
- 3/18 • • • Liquid cooling of valve [1, 2006.01]
- 3/20 • Shapes or constructions of valve members, not provided for in preceding subgroups of this group [1, 2006.01]
- 3/22 • Valve seats not provided for in preceding subgroups of this group; Fixing of valve seats [1, 2006.01]
- 3/24 • Safety means or accessories, not provided for in preceding subgroups of this group [1, 2006.01]
- 5/00 Slide-valve gear or valve arrangements (with pure rotary or oscillatory movement F01L 7/00) [1, 2006.01]**
- 5/02 • with other than cylindrical, sleeve, or part-annularly-shaped valves, e.g. with flat-type valves [1, 2006.01]
- 5/04 • with cylindrical, sleeve, or part-annularly-shaped valves [1, 2006.01]
- 5/06 • • surrounding working cylinder or piston [1, 2006.01]
- 5/08 • • • Arrangements with several movements or several valves, e.g. one valve inside the other (with part-annularly-shaped valves F01L 5/12) [1, 2006.01]
- 5/10 • • • • with reciprocating and other movement of same valve [1, 2006.01]
- 5/12 • • • Arrangements with part-annularly-shaped valves [1, 2006.01]
- 5/14 • characterised by the provision of valves with reciprocating and other movements (surrounding working cylinder or piston F01L 5/06) [1, 2006.01]
- 5/16 • • with reciprocating and other movement of same valve, e.g. longitudinally and in cross direction of working cylinder [1, 2006.01]
- 5/18 • • with reciprocating valve and other slide valve [1, 2006.01]
- 5/20 • specially for two-stroke engines (F01L 5/06, F01L 5/14 take precedence) [1, 2006.01]
- 5/22 • Multiple-valve arrangements (with valves surrounding working cylinder or piston F01L 5/06; with reciprocating and other slide valves F01L 5/18; specially for two-stroke engines F01L 5/20) [1, 2006.01]
- 5/24 • Component parts, details, or accessories, not provided for in preceding subgroups of this group [1, 2006.01]
- 7/00 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 F01L 5/00) [1, 2006.01]**
- 7/02 • with cylindrical, sleeve, or part-annularly-shaped valves (of disc type F01L 7/06; of conical type F01L 7/08) [1, 2006.01]
- 7/04 • • surrounding working cylinder or piston [1, 2006.01]
- 7/06 • with disc-type valves [1, 2006.01]
- 7/08 • with conically- or frusto-conically-shaped valves [1, 2006.01]
- 7/10 • with valves of other specific shape, e.g. spherical [1, 2006.01]
- 7/12 • specially for two-stroke engines (F01L 7/04 takes precedence) [1, 2006.01]
- 7/14 • Multiple-valve arrangements (with valves surrounding working cylinder or piston F01L 7/04; specially for two-stroke engines F01L 7/12) [1, 2006.01]

7/16	• Sealing or packing arrangements specially therefor [1, 2006.01]	15/14	• Arrangements with several co-operating main valves, e.g. reciprocatory and rotary [1, 2006.01]
7/18	• Component parts, details, or accessories, not provided for in preceding subgroups of this group [1, 2006.01]	15/16	• • with reciprocatory slide valves only [1, 2006.01]
9/00	Valve-gear or valve arrangements actuated non-mechanically [1, 2006.01]	15/18	• Valve arrangements not provided for in preceding subgroups of this group [1, 2006.01]
9/02	• by fluid means, e.g. hydraulic [1, 2006.01]	15/20	• Component parts, details, or accessories, not provided for in preceding subgroups of this group [1, 2006.01]
9/04	• by electric means [1, 2006.01]	17/00	Slide-valve gear or valve arrangements with cylindrical, sleeve, or part-annularly-shaped valves surrounding working cylinder or piston [1, 2006.01]
11/00	Valve arrangements in working piston or piston-rod [1, 2006.01]	17/02	• Drive, or adjustment during operation, peculiar thereto, e.g. for reciprocating and oscillating movements or for several valves one inside the other [1, 2006.01]
11/02	• in piston [1, 2006.01]	19/00	Slide-valve gear or valve arrangements with reciprocatory and other movement of same valve, other than provided for in group F01L 17/00, e.g. longitudinally and in cross direction of working cylinder [1, 2006.01]
11/04	• • operated by movement of connecting-rod [1, 2006.01]	19/02	• Drive, or adjustment during operation, peculiar thereto [1, 2006.01]
11/06	• • • operating oscillatory valve [1, 2006.01]	21/00	Use of working pistons or piston-rods as fluid-distributing valves or as valve-supporting elements, e.g. in free-piston machines [1, 2006.01]
13/00	Modifications of valve-gear to facilitate reversing, braking, starting, changing compression ratio, or other specific operations [1, 2006.01]	21/02	• Piston or piston-rod used as valve member [1, 2006.01]
13/02	• for reversing [1, 2006.01]	21/04	• Valves arranged in or on piston or piston-rod [1, 2006.01]
13/04	• for starting by means of fluid pressure [1, 2006.01]	23/00	Valves controlled by impact of piston, e.g. in free-piston machines [1, 2006.01]
13/06	• for braking [1, 2006.01]	25/00	Drive, or adjustment during operation, of distribution or expansion valves by non-mechanical means [1, 2006.01]
13/08	• for decompression, e.g. during starting; for changing compression ratio [1, 2006.01]	25/02	• by fluid means [1, 2006.01]
<u>Valve-gear or valve arrangements specially adapted for steam engines, or specially adapted for other positive-displacement machines or engines with variable working-fluid distribution</u>		25/04	• • by working fluid of machine or engine, e.g. free-piston machine [1, 2006.01]
<u>Note(s)</u>		25/06	• • • Arrangements with main and auxiliary valves, at least one of them being fluid-driven [1, 2006.01]
1. Groups F01L 15/00-F01L 31/00 <u>cover</u> :		25/08	• by electric or magnetic means [1, 2006.01]
• valve drive or means external to valves for adjustment during operation;		27/00	Distribution or expansion-valve gear peculiar to free-piston machines or engines and not provided for in groups F01L 21/00-F01L 25/00 [1, 2006.01]
• tripping-gear;		27/02	• the machine or engine having rotary or oscillatory valves [1, 2006.01]
• reversing-gear;		27/04	• Delayed-action controls, e.g. of cataract- or dash-pot-type [1, 2006.01]
• use of pistons or piston-rods as valves or as valve-supporting elements;		29/00	Reversing-gear (equally usable for control of degree of working fluid admission, and reversing being of secondary importance F01L 31/00) [1, 2006.01]
• valve-gear or valve arrangements peculiar to free-piston machines or engines.		29/02	• by displacing eccentric [1, 2006.01]
2. Groups F01L 15/00-F01L 31/00 <u>do not fully cover</u> subject matter restricted to rotary, oscillatory, or lift-valve gear or valve arrangements, which is covered by group F01L 33/00 or F01L 35/00.		29/04	• by links or guide rods [1, 2006.01]
15/00	Valve-gear or valve arrangements, e.g. with reciprocatory slide valves, other than provided for in groups F01L 17/00-F01L 29/00 (valve drive or external valve-adjustment during operation, <u>see</u> the relevant groups, e.g. F01L 31/00; tripping-gear or tripping of valves F01L 31/00) [1, 2006.01]	29/06	• by interchanging inlet and exhaust ports [1, 2006.01]
15/02	• with valves other than cylindrical, sleeve, or part-annularly-shaped, e.g. flat D-valves [1, 2006.01]	29/08	• specially for rotary or oscillatory valves [1, 2006.01]
15/04	• • main valve being combined with auxiliary valve (of drag-valve type F01L 15/10) [1, 2006.01]	29/10	• Details, e.g. drive [1, 2006.01]
15/06	• • • of Meyer or Rider type, i.e. in which the expansion is varied at the expansion valve itself [1, 2006.01]	29/12	• • Powered reverse gear [1, 2006.01]
15/08	• with cylindrical, sleeve, or part-annularly-shaped valves; Such main valves combined with auxiliary valves [1, 2006.01]		
15/10	• with main slide valve and auxiliary valve dragged thereby [1, 2006.01]		
15/12	• characterised by having means for effecting pressure equilibrium between two different cylinder spaces at idling [1, 2006.01]		

F01L

- 31/00 Valve drive, valve adjustment during operation, or other valve control, not provided for in groups F01L 15/00-F01L 29/00** (sensing elements measuring the variable or condition to be controlled or regulated F01B) **[1, 2006.01]**
- 31/02 • with tripping-gear (for oscillatory valves F01L 31/06); Tripping of valves **[1, 2006.01]**
 - 31/04 • • with positively-driven trip levers **[1, 2006.01]**
 - 31/06 • with tripping-gear specially for oscillatory valves; Oscillatory tripping-valves, e.g. of Corliss type **[1, 2006.01]**
 - 31/08 • Valve drive or valve adjustment, apart from tripping aspects; Positively-driven gear **[1, 2006.01]**
 - 31/10 • • the drive being effected by eccentrics (F01L 31/14 takes precedence) **[1, 2006.01]**
 - 31/12 • • • Valve adjustment by displacing eccentric **[1, 2006.01]**
 - 31/14 • • Valve adjustment by links or guide rods, e.g. in valve-gears with eccentric drive **[1, 2006.01]**
 - 31/16 • • the drive being effected by specific means other than eccentric, e.g. cams; Valve adjustment in connection with such drives **[1, 2006.01]**
 - 31/18 • • specially for rotary or oscillatory valves **[1, 2006.01]**
 - 31/20 • • • Valve adjustment **[1, 2006.01]**
 - 31/22 • • specially for lift valves **[1, 2006.01]**
 - 31/24 • • • Valve adjustment **[1, 2006.01]**

Rotary or oscillatory slide-valve gear or lift-valve gear or such valve arrangements specially adapted for steam engines, or specially adapted for other positive-displacement machines or engines with variable working-fluid distribution

- 33/00 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 F01L 15/00-F01L 31/00) **[1, 2006.01]**
- 33/02 • rotary **[1, 2006.01]**
 - 33/04 • oscillatory **[1, 2006.01]**
- 35/00 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 F01L 15/00-F01L 31/00) **[1, 2006.01]**
- 35/02 • Valves **[1, 2006.01]**
 - 35/04 • Arrangements of valves in the machine or engine, e.g. relative to working cylinder **[1, 2006.01]**