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

F04 POSITIVE-DISPLACEMENT MACHINES FOR LIQUIDS; PUMPS FOR LIQUIDS OR ELASTIC FLUIDS

F04C ROTARY-PISTON, OR OSCILLATING-PISTON, POSITIVE-DISPLACEMENT MACHINES FOR LIQUIDS (engines driven by liquids F03C); ROTARY-PISTON, OR OSCILLATING-PISTON, POSITIVE-DISPLACEMENT PUMPS (engine fuel-injection pumps F02M)

Note(s)

Attention is drawn to the Notes preceding class F01, especially as regards the definitions of "machines", "pumps", "positive displacement", "rotary-piston machines", "oscillating-piston machines", "rotary piston", "co-operating members", "movement of co-operating members", "teeth or tooth-equivalents", and "internal axis".

Subclass index

MACHINES FOR LIQUIDS; PUMPS FOR LIQUIDS OR FOR LIQUIDS AND ELASTIC FLUIDS
- Rotary-piston
  - general characteristics; non-parallel axes of movement of co-operating members 2/00, 3/00
  - resiliently-deformable chamber walls; fluid ring 5/00, 7/00
- Oscillating-piston 9/00
- Combinations or adaptations 11/00, 13/00
- Pump installations 11/00
- Control; monitoring; safety arrangements 14/00
- Other details or accessories 15/00

PUMPS SPECIALLY ADAPTED FOR ELASTIC FLUIDS
- Rotary-piston pumps 18/00
- Rotary-piston pumps with fluid ring or the like 19/00
- Oscillating-piston pumps 21/00
- Combinations of two or more pumps, each being of rotary-piston or oscillating-piston type; Pumping installations; Multi-stage pumps 23/00
- Adaptations of pumps for special use 25/00
- Sealing arrangements in rotary-piston pumps 27/00
- Control; monitoring; safety arrangements 28/00
- Other components parts, details or accessories 29/00

Machines for liquids; Pumps for liquids or for liquids and elastic fluids [2011.01]

2/00 Rotary-piston machines or pumps (with non-parallel axes of co-operating members F04C 3/00; with the working-chamber walls at least partly resiliently deformable F04C 5/00; with fluid ring or the like F04C 7/00; rotary-piston pumps specially adapted for elastic fluids F04C 18/00, F04C 19/00; rotary-piston machines or pumps in which the working-fluid is exclusively displaced by, or exclusively displaces, one or more reciprocating pistons F04B) **[3, 2006.01]**

Note(s) [3]

Group F04C 2/30 takes precedence over groups F04C 2/02-F04C 2/24.

2/02 • of arcuate-engagement type, i.e. with circular translatory movement of co-operating members, each member having the same number of teeth or tooth-equivalents **[3, 2006.01]**

2/04 • • of internal-axis type **[3, 2006.01]**

2/06 • • of other than internal-axis type (F04C 2/063 takes precedence) **[3, 2006.01]**

2/063 • • with coaxially-mounted members having continuously-changing circumferential spacing between them **[3, 2006.01]**

2/067 • • • having cam-and-follower type drive **[3, 2006.01]**

2/07 • • • having crankshaft-and-connecting-rod type drive **[3, 2006.01]**

2/073 • • • having pawl-and-ratchet type drive **[3, 2006.01]**

2/077 • • • having toothed-gearing type drive **[3, 2006.01]**

2/08 • of intermeshing-engagement type, i.e. with engagement of co-operating members similar to that of toothed gearing **[3, 2006.01]**

2/10 • • of internal-axis type with the outer member having more teeth or tooth-equivalents, e.g. rollers, than the inner member **[3, 2006.01]**

2/107 • • • with helical teeth **[3, 2006.01]**

2/113 • • • the inner member carrying rollers intermeshing with the outer member **[3, 2006.01]**
2/12 • • of other than internal-axis type **[3, 2006.01]**
2/14 • • • with toothed rotary pistons **[3, 2006.01]**
2/16 • • • • with helical teeth, e.g. chevron-shaped, screw type **[3, 2006.01]**
2/18 • • • • with similar tooth forms (F04C 2/16 takes precedence) **[3, 2006.01]**
2/20 • • • • with dissimilar tooth forms (F04C 2/16 takes precedence) **[3, 2006.01]**
2/22 • of internal-axis type with equidirectional movement of co-operating members at the points of engagement, or with one of the co-operating members being stationary, the inner member having more teeth or tooth-equivalents than the outer member **[3, 2006.01]**
2/24 • of counter-engagement type, i.e. the movement of co-operating members at the points of engagement being in opposite directions **[3, 2006.01]**
2/26 • • of internal-axis type **[3, 2006.01]**
2/28 • • of other than internal-axis type **[3, 2006.01]**
2/30 • having the characteristics covered by two or more of groups F04C 2/02, F04C 2/08, F04C 2/22, F04C 2/24 or having the characteristics covered by one of these groups together with some other type of movement between co-operating members **[3, 2006.01]**
2/32 • • having both the movement defined in group F04C 2/02 and relative reciprocation between the co-operating members **[3, 2006.01]**
2/324 • • • with vanes hinged to the inner member and reciprocating with respect to the outer member **[3, 2006.01]**
2/328 • • • • and hinged to the outer member **[3, 2006.01]**
2/332 • • • with vanes hinged to the outer member and reciprocating with respect to the inner member **[3, 2006.01]**
2/336 • • • • and hinged to the inner member **[3, 2006.01]**
2/34 • • having the movement defined in group F04C 2/08 or F04C 2/22 and relative reciprocation between the co-operating members **[3, 2006.01]**
2/344 • • • with vanes reciprocating with respect to the inner member **[3, 2006.01]**
2/348 • • • • the vanes positively engaging, with circumferential play, an outer rotatable member **[3, 2006.01]**
2/352 • • • • the vanes being pivoted on the axis of the outer member **[3, 2006.01]**
2/356 • • • with vanes reciprocating with respect to the outer member **[3, 2006.01]**
2/36 • • having both the movements defined in groups F04C 2/22 and F04C 2/24 **[3, 2006.01]**
2/38 • • having the movement defined in group F04C 2/02 and having a hinged member (F04C 2/32 takes precedence) **[3, 2006.01]**
2/39 • • • with vanes hinged to the inner as well as to the outer member **[3, 2006.01]**
2/40 • • having the movement defined in group F04C 2/08 or F04C 2/22 and having a hinged member **[3, 2006.01]**
2/44 • • • with vanes hinged to the inner member **[3, 2006.01]**
2/46 • • • with vanes hinged to the outer member **[3, 2006.01]**

3/00 **Rotary-piston machines or pumps, with non-parallel axes of movement of co-operating members, e.g. of screw type** (with the working-chamber walls at least partly resiliently deformable F04C 5/00; rotary-piston pumps with non-parallel axes of movement of co-operating members specially adapted for elastic fluids F04C 18/48) **[1, 2006.01]**
3/02 • the axes being arranged at an angle of 90 degrees **[5, 2006.01]**
3/04 • • of intermeshing engagement type, i.e. with engagement of co-operating members similar to that of toothed gearing **[5, 2006.01]**
3/06 • the axes being arranged otherwise than at an angle of 90 degrees **[5, 2006.01]**
3/08 • • of intermeshing engagement type, i.e. with engagement of co-operating members similar to that of toothed gearing **[5, 2006.01]**

5/00 **Rotary-piston machines or pumps with the working-chamber walls at least partly resiliently deformable** (such pumps specially adapted for elastic fluids F04C 18/00) **[1, 2006.01]**

7/00 **Rotary-piston machines or pumps with fluid ring or the like** (such pumps specially adapted for elastic fluids F04C 19/00) **[1, 2006.01]**

9/00 **Oscillating-piston machines or pumps** (such pumps specially adapted for elastic fluids F04C 21/00) **[1, 2006.01]**

11/00 **Combinations of two or more machines or pumps, each being of rotary-piston or oscillating-piston type** (combinations of such pumps specially adapted for elastic fluids F04C 23/00)**; Pumping installations** (F04C 13/00 takes precedence; specially adapted for elastic fluids F04C 23/00; fluid gearing F16H 39/00-F16H 47/00) **[1, 2006.01]**

13/00 **Adaptations of machines or pumps for special use, e.g. for extremely high pressures** (of pumps specially adapted for elastic fluids F04C 25/00) **[1, 2006.01]**

14/00 **Control of, monitoring of, or safety arrangements for, machines, pumps or pumping installations** (of pumps or pumping installations specially adapted for elastic fluids F04C 28/00) **[2006.01]**
14/02 • specially adapted for several machines or pumps connected in series or in parallel **[2006.01]**
14/04 • specially adapted for reversible machines or pumps **[2006.01]**
14/06 • specially adapted for stopping, starting, idling or no-load operation **[2006.01]**
14/08 • characterised by varying the rotational speed **[2006.01]**
14/10 • characterised by changing the positions of the inlet or outlet openings with respect to the working chamber **[2006.01]**
14/12 • • using sliding valves **[2006.01]**
14/14 • • using rotating valves **[2006.01]**
14/16 • • using lift valves **[2006.01]**
14/18 • characterised by varying the volume of the working chamber (by changing the positions of inlet or outlet openings F04C 14/10) **[2006.01]**
14/20 • • by changing the form of the inner or outer contour of the working chamber **[2006.01]**
14/22 • • by changing the eccentricity between cooperating members **[2006.01]**

14/24 • characterised by using valves regulating pressure or flow rate, e.g. discharge valves (F04C 14/10 takes precedence) **[2006.01]**

14/26 • • using bypass channels **[2006.01]**

14/28 • Safety arrangements; Monitoring **[2006.01]**

15/00 Component parts, details or accessories of machines, pumps or pumping installations, not provided for in groups F04C 2/00-F04C 14/00 (of pumps specially adapted for elastic fluids F04C 18/00-F04C 29/00) **[1, 2006.01]**

15/06 • Arrangements for admission or discharge of the working fluid, e.g. constructional features of the inlet or outlet **[2006.01]**

Pumps specially adapted for elastic fluids

18/00 Rotary-piston pumps specially adapted for elastic fluids (with fluid ring or the like F04C 19/00; rotary-piston pumps in which the working-fluid is exclusively displaced by one or more reciprocating pistons F04B) **[3, 2006.01]**

Note(s) [3, 5]

Group F04C 18/30 takes precedence over groups F04C 18/02-F04C 18/24.

18/02 • of arcuate-engagement type, i.e. with circular translatory movement of co-operating members, each member having the same number of teeth or tooth-equivalents **[3, 2006.01]**

18/04 • • of internal-axis type **[3, 2006.01]**

18/06 • • of other than internal-axis type (F04C 18/063 takes precedence) **[3, 2006.01]**

18/063 • • with coaxially-mounted members having continuously-changing circumferential spacing between them **[3, 2006.01]**

18/067 • • • having cam-and-follower type drive **[3, 2006.01]**

18/07 • • • having crankshaft-and-connecting-rod type drive **[3, 2006.01]**

18/073 • • • having pawl-and-ratchet type drive **[3, 2006.01]**

18/077 • • • having toothed-gearing type drive **[3, 2006.01]**

18/08 • of intermeshing-engagement type, i.e. with engagement of co-operating members similar to that of toothed gearing **[3, 2006.01]**

18/10 • • of internal-axis type with the outer member having more teeth or tooth-equivalents, e.g. rollers, than the inner member **[3, 2006.01]**

18/107 • • • with helical teeth **[3, 2006.01]**

18/113 • • • the inner member carrying rollers intermeshing with the outer member **[3, 2006.01]**

18/12 • • of other than internal-axis type **[3, 2006.01]**

18/14 • • • with toothed rotary pistons **[3, 2006.01]**

18/16 • • • • with helical teeth, e.g. chevron-shaped, screw type **[3, 2006.01]**

18/18 • • • • with similar tooth forms (F04C 18/16 takes precedence) **[3, 2006.01]**

18/20 • • • • with dissimilar tooth forms (F04C 18/16 takes precedence) **[3, 2006.01]**

18/22 • of internal-axis type with equidirectional movement of co-operating members at the points of engagement, or with one of the co-operating members being stationary, the inner member having more teeth or tooth-equivalents than the outer member **[3, 2006.01]**

18/24 • of counter-engagement type, i.e. the movement of co-operating members at the points of engagement being in opposite directions **[3, 2006.01]**

18/26 • • of internal-axis type **[3, 2006.01]**

18/28 • • of other than internal-axis type **[3, 2006.01]**

18/30 • having the characteristics covered by two or more of groups F04C 18/02, F04C 18/08, F04C 18/22, F04C 18/24, F04C 18/48, or having the characteristics covered by one of these groups together with some other type of movement between co-operating members **[3, 2006.01]**

18/32 • • having both the movement defined in group F04C 18/02 and relative reciprocation between the co-operating members **[3, 2006.01]**

18/324 • • • with vanes hinged to the inner member and reciprocating with respect to the outer member **[3, 2006.01]**

18/328 • • • • and hinged to the outer member **[3, 2006.01]**

18/332 • • • with vanes hinged to the outer member and reciprocating with respect to the inner member **[3, 2006.01]**

18/336 • • • • and hinged to the inner member **[3, 2006.01]**

18/34 • • having the movement defined in group F04C 18/08 or F04C 18/22 and relative reciprocation between the co-operating members **[3, 2006.01]**

18/344 • • • with vanes reciprocating with respect to the inner member **[3, 2006.01]**

18/348 • • • • the vanes positively engaging, with circumferential play, an outer rotatable member **[3, 2006.01]**

18/352 • • • • the vanes being pivoted on the axis of the outer member **[3, 2006.01]**

18/356 • • • with vanes reciprocating with respect to the outer member **[3, 2006.01]**

18/36 • • having both the movements defined in groups F04C 18/22 and F04C 18/24 **[3, 2006.01]**

18/38 • • having the movement defined in group F04C 18/02 and having a hinged member (F04C 18/32 takes precedence) **[3, 2006.01]**

18/39 • • • with vanes hinged to the inner as well as to the outer member **[3, 2006.01]**

18/40 • • having the movement defined in group F04C 18/08 or F04C 18/22 and having a hinged member **[3, 2006.01]**

18/44 • • • with vanes hinged to the inner member **[3, 2006.01]**

18/46 • • • with vanes hinged to the outer member **[3, 2006.01]**

18/48 • Rotary-piston pumps with non-parallel axes of movement of co-operating members **[5, 2006.01]**

Note(s) [2006.01]

Group F04C 18/30 takes precedence over group F04C 18/48.

18/50 • • the axes being arranged at an angle of 90 degrees **[5, 2006.01]**

18/52 • • • of intermeshing engagement type, i.e. with engagement of co-operating members similar to that of toothed gearing **[5, 2006.01]**

18/54 • • the axes being arranged otherwise than at an angle of 90 degrees **[5, 2006.01]**

18/56 • • • of intermeshing engagement type, i.e. with engagement of co-operating members similar to that of toothed gearing **[5, 2006.01]**

19/00 Rotary-piston pumps with fluid ring or the like, specially adapted for elastic fluids [1, 2006.01]

21/00 Oscillating-piston pumps specially adapted for elastic fluids [1, 2006.01]

23/00 Combinations of two or more pumps, each being of rotary-piston or oscillating-piston type, specially adapted for elastic fluids; Pumping installations specially adapted for elastic fluids; Multi-stage pumps specially adapted for elastic fluids (F04C 25/00 takes precedence) **[1, 2006.01]**

23/02 • Pumps characterised by combination with, or adaptation to, specific driving engines or motors (predominant aspects of the engines or motors, see the relevant classes) **[1, 2006.01]**

25/00 Adaptations for special use of pumps for elastic fluids [1, 2006.01]

25/02 • for producing high vacuum (sealing arrangements F04C 27/00; silencing F04C 29/06) **[1, 2006.01]**

27/00 Sealing arrangements in rotary-piston pumps specially adapted for elastic fluids [1, 2006.01]

27/02 • Liquid sealing for high-vacuum pumps **[1, 2006.01]**

28/00 Control of, monitoring of, or safety arrangements for, pumps or pumping installations specially adapted for elastic fluids [2006.01]

28/02 • specially adapted for several pumps connected in series or in parallel **[2006.01]**

28/04 • specially adapted for reversible pumps **[2006.01]**

28/06 • specially adapted for stopping, starting, idling or no-load operation **[2006.01]**

28/08 • characterised by varying the rotational speed **[2006.01]**

28/10 • characterised by changing the positions of the inlet or outlet openings with respect to the working chamber **[2006.01]**

28/12 • • using sliding valves **[2006.01]**

28/14 • • using rotating valves **[2006.01]**

28/16 • • using lift valves **[2006.01]**

28/18 • characterised by varying the volume of the working chamber (by changing the positions of inlet or outlet openings F04C 28/10) **[2006.01]**

28/20 • • by changing the form of the inner or outer contour of the working chamber **[2006.01]**

28/22 • • by changing the eccentricity between cooperating members **[2006.01]**

28/24 • characterised by using valves regulating pressure or flow rate, e.g. discharge valves (F04C 28/10 takes precedence) **[2006.01]**

28/26 • • using bypass channels **[2006.01]**

28/28 • Safety arrangements; Monitoring **[2006.01]**

29/00 Component parts, details, or accessories, of pumps or pumping installations specially adapted for elastic fluids, not provided for in groups F04C 18/00-F04C 28/00 [1, 2006.01]

29/02 • Lubrication; Lubricant separation **[1, 2006.01]**

29/04 • Heating; Cooling; Heat insulation **[1, 2006.01]**

29/06 • Silencing **[1, 2006.01]**

29/12 • Arrangements for admission or discharge of the working fluid, e.g. constructional features of the inlet or outlet **[2006.01]**