

F04 POSITIVE-DISPLACEMENT MACHINES FOR LIQUIDS; PUMPS FOR LIQUIDS OR ELASTIC FLUIDS (portable fire extinguishers with manually-operated pumps A62C 11/00, with power-driven pumps A62C 25/00; charging or scavenging combustion engines by pumps F02B; engine fuel-injection pumps F02M; ion pumps H01J 41/12; electrodynamic pumps H02K 44/02)

F04C ROTARY-PISTON, OR OSCILLATING-PISTON, POSITIVE-DISPLACEMENT MACHINES FOR LIQUIDS (engines F03C); **ROTARY-PISTON, OR OSCILLATING-PISTON, POSITIVE-DISPLACEMENT PUMPS**

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”.

MACHINES OR PUMPS

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

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| <p>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]</p> <p>Group F04C 2/30 takes precedence over groups F04C 2/02 F04C 2/24. [3]</p> | <p>2/08 . of intermeshing-engagement type, i.e. with engagement of co-operating members similar to that of toothed gearing [3]</p> <p>2/10 . . of internal-axis type with the outer member having more teeth or tooth-equivalents, e.g. rollers, than the inner member [3]</p> <p>2/107 . . . with helical teeth [3]</p> <p>2/113 . . . the inner member carrying rollers intermeshing with the outer member [3]</p> <p>2/12 . . of other than internal-axis type [3]</p> <p>2/14 . . . with toothed rotary pistons [3]</p> <p>2/16 with helical teeth, e.g. chevron-shaped, screw type [3]</p> <p>2/18 with similar tooth forms (F04C 2/16 takes precedence) [3]</p> <p>2/20 with dissimilar tooth forms (F04C 2/16 takes precedence) [3]</p> <p>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]</p> <p>2/24 . of counter-engagement type, i.e. the movement of co-operating members at the points of engagement being in opposite directions [3]</p> <p>2/26 . . of internal-axis type [3]</p> <p>2/28 . . of other than internal-axis type [3]</p> |
| <p>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]</p> <p>2/04 . . of internal-axis type [3]</p> <p>2/06 . . of other than internal-axis type (F04C 2/063 takes precedence) [3]</p> <p>2/063 . . with coaxially-mounted members having continuously-changing circumferential spacing between them [3]</p> <p>2/067 . . . having cam-and-follower type drive [3]</p> <p>2/07 . . . having crankshaft-and-connecting-rod type drive [3]</p> <p>2/073 . . . having pawl-and-ratchet type drive [3]</p> <p>2/077 . . . having toothed-gearing type drive [3]</p> | |

- 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]
- 2/32 . . having both the movement defined in group F04C 2/02 and relative reciprocation between the co-operating members [3]
- 2/324 . . . with vanes hinged to the inner member and reciprocating with respect to the outer member [3]
- 2/328 and hinged to the outer member [3]
- 2/332 . . . with vanes hinged to the outer member and reciprocating with respect to the inner member [3]
- 2/336 and hinged to the inner member [3]
- 2/34 . . having the movement defined in group F04C 2/08 or F04C 2/22 and relative reciprocation between the co-operating members [3]
- 2/344 . . . with vanes reciprocating with respect to the inner member [3]
- 2/348 the vanes positively engaging, with circumferential play, an outer rotatable member [3]
- 2/352 the vanes being pivoted on the axis of the outer member [3]
- 2/356 . . . with vanes reciprocating with respect to the outer member [3]
- 2/36 . . having both the movements defined in groups F04C 2/22 and F04C 2/24 [3]
- 2/38 . . having the movement defined in group F04C 2/02 and having a hinged member (F04C 2/32 takes precedence) [3]
- 2/39 . . . with vanes hinged to the inner as well as to the outer member [3]
- 2/40 . . having the movement defined in group F04C 2/08 or F04C 2/22 and having a hinged member [3]
- 2/44 . . . with vanes hinged to the inner member [3]
- 2/46 . . . with vanes hinged to the outer member [3]
- 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)
 - 3/02 . the axes being arranged at an angle of 90 degrees [5]
 - 3/04 . . of intermeshing engagement type, i.e. with engagement of co-operating members similar to that of toothed gearing [5]
 - 3/06 . the axes being arranged otherwise than at an angle of 90 degrees [5]
 - 3/08 . . of intermeshing engagement type, i.e. with engagement of co-operating members similar to that of toothed gearing [5]
- 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)
- 7/00 Rotary-piston machines or pumps with fluid ring or the like** (such pumps specially adapted for elastic fluids F04C 19/00)
- 9/00 Oscillating-piston machines or pumps** (such pumps specially adapted for elastic fluids F04C 21/00)

- 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)
- 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)
- 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) [8]
 - 14/02 . specially adapted for several machines or pumps connected in series or in parallel [8]
 - 14/04 . specially adapted for reversible machines or pumps [8]
 - 14/06 . specially adapted for stopping, starting, idling or no-load operation [8]
 - 14/08 . characterised by varying the rotational speed [8]
 - 14/10 . characterised by changing the positions of the inlet or outlet openings with respect to the working chamber [8]
 - 14/12 . . using sliding valves [8]
 - 14/14 . . using rotating valves [8]
 - 14/16 . . using lift valves [8]
 - 14/18 . characterised by varying the volume of the working chamber (by changing the positions of inlet or outlet openings F04C 14/10) [8]
 - 14/20 . . by changing the form of the inner or outer contour of the working chamber [8]
 - 14/22 . . by changing the eccentricity between cooperating members [8]
 - 14/24 . characterised by using valves regulating pressure or flow rate, e.g. discharge valves (F04C 14/10 takes precedence) [8]
 - 14/26 . . using bypass channels [8]
 - 14/28 . Safety arrangements; Monitoring [8]
- 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) [1,8]
 - 15/06 . Arrangements for admission or discharge of the working fluid, e.g. constructional features of the inlet or outlet [8]

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]
 - Group F04C 18/30 takes precedence over groups F04C 18/02 F04C 18/24. [3,5]
 - 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]
 - 18/04 . . of internal-axis type [3]
 - 18/06 . . of other than internal-axis type (F04C 18/063 takes precedence) [3]

- 18/063 . . . with coaxially-mounted members having continuously-changing circumferential spacing between them [3]
 - 18/067 . . . having cam-and-follower type drive [3]
 - 18/07 . . . having crankshaft-and-connecting-rod type drive [3]
 - 18/073 . . . having pawl-and-ratchet type drive [3]
 - 18/077 . . . having toothed-gearing type drive [3]
 - 18/08 . . of intermeshing-engagement type, i.e. with engagement of co-operating members similar to that of toothed gearing [3]
 - 18/10 . . of internal-axis type with the outer member having more teeth or tooth-equivalents, e.g. rollers, than the inner member [3]
 - 18/107 . . . with helical teeth [3]
 - 18/113 . . . the inner member carrying rollers intermeshing with the outer member [3]
 - 18/12 . . of other than internal-axis type [3]
 - 18/14 . . . with toothed rotary pistons [3]
 - 18/16 with helical teeth, e.g. chevron-shaped, screw type [3]
 - 18/18 with similar tooth forms (F04C 18/16 takes precedence) [3]
 - 18/20 with dissimilar tooth forms (F04C 18/16 takes precedence) [3]
 - 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]
 - 18/24 . . of counter-engagement type, i.e. the movement of co-operating members at the points of engagement being in opposite directions [3]
 - 18/26 . . of internal-axis type [3]
 - 18/28 . . of other than internal-axis type [3]
 - 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]
 - 18/32 . . having both the movement defined in group F04C 18/02 and relative reciprocation between the co-operating members [3]
 - 18/324 . . . with vanes hinged to the inner member and reciprocating with respect to the outer member [3]
 - 18/328 and hinged to the outer member [3]
 - 18/332 . . . with vanes hinged to the outer member and reciprocating with respect to the inner member [3]
 - 18/336 and hinged to the inner member [3]
 - 18/34 . . having the movement defined in group F04C 18/08 or F04C 18/22 and relative reciprocation between the co-operating members [3]
 - 18/344 . . . with vanes reciprocating with respect to the inner member [3]
 - 18/348 the vanes positively engaging, with circumferential play, an outer rotatable member [3]
 - 18/352 the vanes being pivoted on the axis of the outer member [3]
 - 18/356 . . . with vanes reciprocating with respect to the outer member [3]
 - 18/36 . . having both the movements defined in groups F04C 18/22 and F04C 18/24 [3]
 - 18/38 . . having the movement defined in group F04C 18/02 and having a hinged member (F04C 18/32 takes precedence) [3]
 - 18/39 . . . with vanes hinged to the inner as well as to the outer member [3]
 - 18/40 . . having the movement defined in group F04C 18/08 or F04C 18/22 and having a hinged member [3]
 - 18/44 . . . with vanes hinged to the inner member [3]
 - 18/46 . . . with vanes hinged to the outer member [3]
 - 18/48 . . Rotary-piston pumps with non-parallel axes of movement of co-operating members [5]
- Group F04C 18/30 takes precedence over group F04C 18/48. [8]
- 18/50 . . the axes being arranged at an angle of 90 degrees [5]
 - 18/52 . . . of intermeshing engagement type, i.e. with engagement of co-operating members similar to that of toothed gearing [5]
 - 18/54 . . the axes being arranged otherwise than at an angle of 90 degrees [5]
 - 18/56 . . . of intermeshing engagement type, i.e. with engagement of co-operating members similar to that of toothed gearing [5]
 - 19/00 Rotary-piston pumps with fluid ring or the like, specially adapted for elastic fluids**
 - 21/00 Oscillating-piston pumps specially adapted for elastic fluids**
 - 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)
 - 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)
 - 25/00 Adaptations for special use of pumps for elastic fluids**
 - 25/02 . . for producing high vacuum (sealing arrangements F04C 27/00; silencing F04C 29/06)
 - 27/00 Sealing arrangements in rotary-piston pumps specially adapted for elastic fluids**
 - 27/02 . . Liquid sealing for high-vacuum pumps
 - 28/00 Control of, monitoring of, or safety arrangements for, pumps or pumping installations specially adapted for elastic fluids [8]**
 - 28/02 . . specially adapted for several pumps connected in series or in parallel [8]
 - 28/04 . . specially adapted for reversible pumps [8]
 - 28/06 . . specially adapted for stopping, starting, idling or no-load operation [8]
 - 28/08 . . characterised by varying the rotational speed [8]
 - 28/10 . . characterised by changing the positions of the inlet or outlet openings with respect to the working chamber [8]
 - 28/12 . . using sliding valves [8]

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- 28/14 . . using rotating valves [8]
- 28/16 . . using lift valves [8]
- 28/18 . characterised by varying the volume of the working chamber (by changing the positions of inlet or outlet openings F04C 28/10) [8]
- 28/20 . . by changing the form of the inner or outer contour of the working chamber [8]
- 28/22 . . by changing the eccentricity between cooperating members [8]
- 28/24 . characterised by using valves regulating pressure or flow rate, e.g. discharge valves (F04C 28/10 takes precedence) [8]
- 28/26 . . using bypass channels [8]
- 28/28 . Safety arrangements; Monitoring [8]

- 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**
- 29/02 . Lubrication (of machines or engines in general F01M); Lubricant separation (separation in general B01D)
- 29/04 . Heating; Cooling (of machines or engines in general F01P); Heat insulation (heat insulation in general F16L 59/00)
- 29/06 . Silencing (gas-flow silencers or exhaust apparatus for machines or engines in general F01N)
- 29/12 . Arrangements for admission or discharge of the working fluid, e.g. constructional features of the inlet or outlet [8]