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

F16 ENGINEERING ELEMENTS OR UNITS; GENERAL MEASURES FOR PRODUCING AND MAINTAINING EFFECTIVE FUNCTIONING OF MACHINES OR INSTALLATIONS; THERMAL INSULATION IN GENERAL

F16B DEVICES FOR FASTENING OR SECURING CONSTRUCTIONAL ELEMENTS OR MACHINE PARTS TOGETHER, e.g. NAILS, BOLTS, CIRCLIPS, CLAMPS, CLIPS OR WEDGES; JOINTS OR JOINTING (couplings for transmitting rotation F16D)

Note(s)

Attention is drawn to:

a. the Note following group E04B 1/38;
b. the following places:

A44B.....Buckles, slide fasteners
A47G 3/00.....Ornamental heads for nails, screws, or the like
B42F 3/00.....Means, not using staples, for attaching sheets temporarily together
E01B 9/10.....Screws or bolts for railway sleepers
E01B 11/00.....Rail joints
E04.....Connections for building
E04D 13/08.....Clamping means for down pipes for roof drainage
E04F 13/21.....Fastening means specially adapted for covering or lining elements for buildings
E04G 5/04.....Fastening scaffolds against buildings
E04G 7/00.....Scaffolding couplings
E05C.....Bolts or fasteners for wings, specially for doors or windows
F16C 29/10.....Locking bearings for parts moving only linearly
F16G 17/00.....Hooks as integral parts of chains
F16L.....Pipe joints
F16L 3/00.....Supports for pipes, cables or protective tubing, e.g. hangers, holders, clamps, cleats, clips, brackets
F16L 33/02.....Clips for connecting hoses to rigid members
H01F 7/00.....Magnetic holding devices
H02N 13/00.....Electrostatic holding devices.

Subclass index

1/00 Devices for securing together, or preventing relative movement between, constructional elements or machine parts

Note(s)

Groups F16B 2/00-F16B 47/00 take precedence over group F16B 1/00.

1/02 • Means for securing elements of mechanisms after operation (means for bringing members to rest F16D)

1/04 • • disengaged by movement of the actuating member of the element (locking of actuators G05G, e.g. G05G 5/00)

Fastenings for constructional elements or machine parts in general

2/00 Friction-grip releasable fastenings (for cables or ropes, e.g. cleats, F16G 11/00; supports for pipes, cables or protective tubing F16L 3/00)

2/02 • Clamps, i.e. with gripping action effected by positive means other than the inherent resistance to deformation of the material of the fastening

2/04 • • internal, i.e. with spreading action (F16B 2/14-F16B 2/18 take precedence)

2/06 • • external, i.e. with contracting action (F16B 2/14-F16B 2/18 take precedence)

2/08 • • • using bands (clips for connecting hoses to rigid members F16L 33/02)

2/10 • • • using pivoting jaws

2/12 • • • using sliding jaws

2/14 • • using wedges

2/16 • • using rollers or balls

2/18 • • using cams, levers, eccentrics, or toggles

2/20 • Clips, i.e. with gripping action effected solely by the inherent resistance to deformation of the material of the fastening

2/22 • • of resilient material, e.g. rubbery material

2/24 • • • of metal

2/26 • • of pliable non-resilient material, e.g. plant tie

3/00 Key-type connections; Keys (F16B 2/00 takes precedence; for rods or tubes mutually F16B 7/00)

3/04 • using keys formed of wire or other flexible material, to be inserted through an opening giving access to grooves in the adjacent surfaces of the parts to be connected

3/06 • using taper sleeves

4/00 Shrinkage connection, e.g. assembled with the parts at different temperature; Force fits (restricted to metal parts or objects B23P 11/02)**; Non-releasable friction-grip fastenings** (F16B 2/00 takes precedence)

5/00 Joining sheets or plates to one another or to strips or bars parallel to them (by sticking together F16B 11/00; dowel connections F16B 13/00; pins, including deformable elements F16B 19/00; covering of walls E04F 13/00; fastening signs, plates, panels, or boards to a supporting structure, fastening readily-detachable elements, e.g. letters, to signs, plates, panels, or boards, G09F 7/00)

5/01 • by means of fastening elements specially adapted for honeycomb panels

5/02 • by means of fastening members using screw-thread (construction of screw-threaded connections F16B 25/00-F16B 39/00)

5/04 • by means of riveting (rivets F16B 19/04)

5/06 • by means of clamps or clips (friction-grip releasable fastenings in general F16B 2/00)

5/07 • by means of multiple interengaging protrusions on the surfaces, e.g. hooks, coils

5/08 • by means of welds or the like (welding B23K)

5/10 • by means of bayonet connections (fastening devices locking by rotation F16B 21/02)

5/12 • Fastening strips or bars to sheets or plates, e.g. rubber strips, decorative strips for motor vehicles, by means of clips (friction-grip releasable fastenings in general F16B 2/00; fastening rods or tubular parts to flat surfaces at an angle F16B 9/00; clips for connecting hoses to rigid members F16L 33/02)

7/00 Connections of rods or tubes, e.g. of non-circular section, mutually, including resilient connections (umbrella frames A45B 25/02; welding or soldering of connections B23K; vehicle connections in general B60D; railway couplings B61G; bicycle frames B62K; couplings for transmitting rotation F16D; couplings for tubes conveying fluid F16L)

7/02 • with conical parts

7/04 • Clamping or clipping connections (friction-grip releasable fastenings in general F16B 2/00)

7/06 • Turnbuckles (for cables, ropes, or wire F16G 11/12)

7/08 • Pipe saddles (friction-grip releasable fastenings in general F16B 2/00)

7/10 • Telescoping systems (for scaffolding E04G 25/04; telescope props for mining E21D 15/14-E21D 15/46; stands or trestles as supports for apparatus or articles placed thereon F16M 11/00)

7/12 • • locking only in extreme extended position

7/14 • • locking in intermediate positions

7/16 • • • locking only against movement in one direction

7/18 • using screw-thread elements

7/20 • using bayonet connections

7/22 • using hooks or like elements

9/00 Connections of rods or tubular parts to flat surfaces at an angle (friction-grip releasable fastenings in general F16B 2/00; making press-fit connections B23P 11/00, B23P 19/00; fluid-tight connecting of pipes to reservoirs, sheets, or the like F16L, e.g. joining pipes to walls F16L 41/00; supports for pipes, cables or protective tubing F16L 3/00)

9/02 • Detachable connections

11/00 Connecting constructional elements or machine parts by sticking or pressing them together, e.g. cold pressure welding (non-electric welding in general B23K; methods of using adhesives independently of the form of the surfaces joined C09J 5/00)

12/00 Jointing of furniture or the like, e.g. hidden from exterior (F16B 2/00-F16B 11/00 take precedence; fastening means per se F16B 13/00-F16B 47/00; wood-working B27)

12/02 • Joints between panels and corner posts

12/04 • Non-loosenable joints for non-metal furniture parts, e.g. glued
12/06 • Non-loosenable joints for metal furniture parts
12/08 • • without use of separate connecting elements
12/10 • using pegs, bolts, tenons, clamps, clips, or the like (glued F16B 12/04; fastening means per se F16B 15/00-F16B 47/00)
12/12 • • for non-metal furniture parts, e.g. made of wood, of plastics
12/14 • • • using threaded bolts or screws
12/16 • • • • using self-tapping screws
12/18 • • • • using drawing bars
12/20 • • • using clamps, clips, wedges, sliding bolts, or the like
12/22 • • • using keyhole-shaped slots and pins
12/24 • • • using separate pins, dowels, or the like
12/26 • • • using snap-action elements
12/28 • • for metal furniture parts
12/30 • • • using threaded bolts
12/32 • • • using clamps, clips, wedges, sliding bolts, or the like
12/34 • • • using keyhole-shaped slots and pins
12/36 • • • using separate pins, dowels, or the like
12/38 • • • using snap-action elements
12/40 • Joints for furniture tubing
12/42 • • connecting furniture tubing to non-tubular parts
12/44 • Leg joints; Corner joints
12/46 • • Non-metal corner connections
12/48 • • Non-metal leg connections (F16B 12/46 takes precedence)
12/50 • • Metal corner connections
12/52 • • Metal leg connections (F16B 12/50 takes precedence)
12/54 • Fittings for bedsteads or the like
12/56 • • Brackets for bedsteads; Coupling joints consisting of bolts or the like; Latches therefor
12/58 • • Tapered connectors for bed rails
12/60 • • Fittings for detachable side panels

13/00 Dowels or other devices fastened in walls or the like by inserting them in holes made therein for that purpose (nails F16B 15/00; self-locking pins or bolts in general, stud-and-socket releasable fastenings F16B 21/00; dowels or bolts for railroad sleepers E01B 9/00; means for anchoring structural elements or bulkheads specially adapted to foundation engineering E02D 5/74; bolts or dowels used while laying bricks or casting concrete E04B 1/38; setting anchoring bolts in shafts, tunnels or galleries E21D 20/00; anchoring bolts for shafts, tunnels or galleries E21D 21/00) **[5]**

13/02 • in one piece with protrusions or ridges on the shaft
13/04 • with parts gripping in the hole or behind the reverse side of the wall after inserting from the front (friction-grip releasable fastenings in general F16B 2/00)
13/06 • • combined with expanding sleeve
13/08 • • with separate gripping parts moved into their final position in relation to the body of the device without further manual operation
13/10 • • with separate gripping parts moved into their final position in relation to the body of the device by a separate operation (F16B 13/06 takes precedence)
13/12 • Separate metal dowel sleeves fastened by inserting the screw, nail, or the like
13/13 • • self-cutting **[2]**
13/14 • Non-metallic plugs or sleeves; Use of liquid, loose solid or kneadable material therefor **[5]**

Fastening means without screw-thread

15/00 Nails; Staples (surgical staples A61B 17/064; manufacture of nails or staples B21G; railway spikes E01B 9/06)

15/02 • with specially shaped heads, e.g. with enlarged surfaces (ornaments for furniture A47B 95/04; removable ornamental heads for nails A47G 3/00)
15/04 • with spreading shaft
15/06 • with barbs, e.g. for metal parts; Drive screws
15/08 • formed in integral series but easily separable

17/00 Fastening means without screw-thread for connecting constructional elements or machine parts by a part of or on one member entering a hole in the other (construction of bolts, pins, or rivets F16B 19/00; riveting F16B 19/04; means for preventing withdrawal of a pin, spigot, or the like from its operative position, stud-and-socket releasable fastenings F16B 21/00)

19/00 Bolts without screw-thread; Pins, including deformable elements (in screwed connections F16B 29/00)**; Rivets** (means for preventing withdrawal F16B 21/00)

19/02 • Bolts or sleeves for positioning of machine parts, e.g. notched taper pins, fitting pins, sleeves, eccentric positioning rings
19/04 • Rivets; Spigots or the like fastened by riveting (lead seals G09F 3/00)
19/05 • • Bolts fastening by swaged-on collars (F16B 19/08 takes precedence)
19/06 • • Solid rivets made in one piece
19/08 • • Hollow rivets; Multi-part rivets
19/10 • • • fastened by expanding mechanically
19/12 • • • fastened by fluid pressure, including by explosion (bolts shot by means of detonation-operated nailing tools into concrete constructions, metal walls, or the like F16B 19/14)
19/14 • Bolts or the like for shooting into concrete constructions, metal walls, or the like by means of detonation-operated nailing tools (tools therefor B25C, B27F)

21/00 Means without screw-thread for preventing relative axial movement of a pin, spigot, shaft, or the like and a member surrounding it (riveted or deformable spigots F16B 19/04; for gudgeon pins F16J 1/18)**; Stud-and-socket releasable fastenings without screw-thread**

21/02 • Releasable fastening devices locking by rotation (with snap action F16B 21/06; studs or coupling-pins with resilient protrusions F16B 21/08)
21/04 • • with bayonet catch
21/06 • Releasable fastening devices with snap action
21/07 • • in which the socket has a resilient part
21/08 • • in which the stud, pin, or spigot has a resilient part (wall-dowels F16B 13/00)
21/09 • Releasable fastening devices with a stud engaging a keyhole slot
21/10 • by separate parts (key-type connection F16B 3/00; locking screws or nuts against rotation by such means F16B 39/04)
21/12 • • with locking-pins or split-pins thrust into holes
21/14 • • • Details of locking-pins or split-pins

21/16 • • with grooves or notches in the pin or shaft
21/18 • • • with circlips or like resilient retaining devices; Details (spring-washers for locking nuts F16B 39/24; adjusting-rings F16B 43/00)
21/20 • • for bolts or shafts without holes, grooves, or notches for locking members

Fastening means using screw-thread

23/00 Specially-shaped heads of bolts or screws for rotations by a tool

25/00 Screws that form threads in the body into which they are screwed, e.g. wood screws, self-tapping screws [4]
25/02 • by a cutting and material removing action, e.g. fluted self-tapping screws **[4]**
25/04 • by a slicing and material displacing action, e.g. wood screws with sharp thread crests **[4]**
25/06 • by swaging, i.e. material deforming action **[4]**
25/08 • by a combination of any two or all of the actions provided for in groups F16B 25/02-F16B 25/06 **[4]**
25/10 • Screws performing an additional function to thread-forming, e.g. drill screws **[4]**

27/00 Bolts, screws, or nuts formed in integral series but easily separable, particularly for use in automatic machines

29/00 Screwed connection with deformation of nut or auxiliary member while fastening (wall-dowels F16B 13/00; members deformed for locking screws, bolts or nuts F16B 39/22)

31/00 Screwed connections specially modified in view of tensile load; Break-bolts (shape of thread F16B 33/04)
31/02 • for indicating or limiting tensile load
31/04 • for maintaining constant tensile load
31/06 • having regard to possibility of fatigue rupture

33/00 Features common to bolt and nut (wall-dowels F16B 13/00)
33/02 • Shape of thread; Special thread-forms (used as screw-locking device F16B 39/30)
33/04 • • in view of tensile load
33/06 • Surface treatment of parts furnished with screw-thread, e.g. for preventing seizure

35/00 Screw-bolts; Stay bolts; Screw-threaded studs; Screws; Set screws (wall-dowels F16B 13/00; thread-cutting screws F16B 25/00)
35/02 • divided longitudinally
35/04 • with specially-shaped head or shaft in order to fix the bolt on or in an object (locking the bolt against turning in the object by the use of accessory parts F16B 39/00)
35/06 • • Specially-shaped heads (special shape in order to rotate the bolt F16B 23/00)

37/00 Nuts or like thread-engaging members (wall-dowels F16B 13/00)
37/02 • made of thin sheet material (fastening to surfaces F16B 37/04)
37/04 • Devices for fastening nuts to surfaces, e.g. sheets, plates
37/06 • • by means of welding or riveting
37/08 • Quickly-detachable nuts, e.g. consisting of two or more parts; Nuts movable along the bolt after tilting the nut
37/10 • • divided parallel or about parallel to the bolt axis
37/12 • with thread-engaging surfaces formed by inserted coil-springs, discs, or the like; Independent pieces of wound wire used as nuts; Threaded inserts for holes
37/14 • Cap nuts; Nut caps or bolt caps
37/16 • Wing nuts (F16B 37/14 takes precedence)

39/00 Locking of screws, bolts, or nuts (wall-dowels F16B 13/00; locking of bottle closures B65D; locking of rail-fastening bolts for permanent ways E01B 9/12; locking of fastening means for railway fishplates E01B 11/38; locking devices for valves or cocks F16K)

Note(s)

In this group, heads of screws or bolts are put on a par with nuts as far as pertains to locking; an object into which a screw is threaded is put on a par with a nut.

39/01 • specially adapted to prevent loosening at extreme temperatures
39/02 • in which the locking takes place after screwing down (F16B 39/01 takes precedence; split-pins, circlips, or the like for preventing relative axial movement only F16B 21/10; fastening nuts by welding or riveting F16B 37/06)
39/04 • • with a member penetrating the screw-threaded surface of at least one part, e.g. a pin, wedge, cotter-pin, screw
39/06 • • • with a pin or staple parallel to the bolt axis
39/08 • • with a cap interacting with the nut, connected to the bolt by a pin or cotter-pin
39/10 • • by a plate or ring immovable with regard to the bolt or object (F16B 39/08 takes precedence)
39/12 • • by means of locknuts
39/14 • • • made of thin sheet material or formed as spring washers (locknuts per se made of thin sheet material F16B 37/02)
39/16 • • • in which the screw-thread of the locknut differs from that of the nut
39/18 • • • • in which the locknut grips with screw-thread in the nuts as well as on the bolt
39/20 • • by means of steel wire or the like (F16B 39/10 takes precedence)
39/22 • in which the locking takes place during screwing down or tightening (F16B 39/01 takes precedence)
39/24 • • by means of washers, spring washers, or resilient plates that lock against the object (locking to the screw-thread F16B 39/14, F16B 39/36)
39/26 • • • with spring washers fastened to the nut or bolt-head
39/28 • • by special members on, or shape of, the nut or bolt (F16B 39/26 takes precedence; locknuts F16B 39/12)
39/282 • • • Locking by means of special shape of work-engaging surfaces, e.g. notched or toothed nuts
39/284 • • • Locking by means of elastic deformation (F16B 39/38 takes precedence)
39/286 • • • • caused by saw cuts
39/30 • • • Locking exclusively by special shape of the screw-thread
39/32 • • • Locking by means of a pawl or pawl-like tongue
39/34 • • • Locking by deformable inserts or like parts
39/36 • • • with conical locking parts, which may be split, including use of separate rings co-operating therewith

39/38 • • • with a second part of the screw-thread which may be resiliently mounted (F16B 39/30 takes precedence)

41/00 Measures against loss of bolts, nuts, or pins; Measures against unauthorised operation of bolts, nuts, or pins (seals G09F 3/00)

43/00 Washers or equivalent devices; Other devices for supporting bolt-heads or nuts (circlips F16B 21/18; with special means for locking bolts or nuts F16B 39/10, F16B 39/24)

43/02 • with special provisions for engaging surfaces which are not perpendicular to a bolt axis or do not surround the bolt

45/00 Hooks; Eyes (if the attaching parts or means are concerned, groups F16B 13/00, F16B 15/00, F16B 19/00, F16B 25/00, F16B 35/00, F16B 47/00 take precedence; for hanging pictures or the like A47G 1/16; towing hooks for ships B63B 21/58; for hoisting or hauling purposes B66C; hooks or eyes with integral parts designed to facilitate quick attachment to cables or ropes at any point F16G 11/14)

45/02 • Hooks with pivoting closing member

45/04 • Hooks with sliding closing member

45/06 • Hooks with two symmetrically-pivoting hook parts

47/00 Suction cups for attaching purposes; Equivalent means using adhesives

F16C SHAFTS; FLEXIBLE SHAFTS; MECHANICAL MEANS FOR TRANSMITTING MOVEMENT IN A FLEXIBLE SHEATHING; ELEMENTS OF CRANKSHAFT MECHANISMS; PIVOTS; PIVOTAL CONNECTIONS; ROTARY ENGINEERING ELEMENTS OTHER THAN GEARING, COUPLING, CLUTCH OR BRAKE ELEMENTS; BEARINGS [5]

Note(s)

In this subclass, the following expression is used with the meaning indicated:

- "rotary engineering elements other than gearing, coupling, clutch or brake elements" covers any engineering element other than gearing, coupling, clutch or brake elements which rotates in so far as its features are affected only by the fact that it rotates.

Subclass index

1/00 Flexible shafts (flexible shafts in dental machines for boring or cutting A61C 1/18)**; Mechanical means for transmitting movement in a flexible sheathing**

1/02 • for conveying rotary movements

1/04 • • Articulated shafts

1/06 • • with guiding-sheathing, tube, or box (F16C 1/04 takes precedence; guiding-sheathings F16C 1/26)

1/08 • • End connections

1/10 • Means for transmitting linear movement in a flexible sheathing, e.g. "Bowden mechanisms" (guiding-sheathings F16C 1/26)

1/12 • • Arrangements for transmitting movement to or from the flexible member

1/14 • • • Construction of the end-piece of the flexible member; Attachment thereof to the flexible member

1/16 • • • in which the end-piece is guided rectilinearly

1/18 • • • in which the end portion of the flexible member is laid along a curved surface of a pivoted member

1/20 • • Construction of flexible members moved to and fro in the sheathing

1/22 • • Adjusting; Compensating length

1/24 • Lubrication; Lubricating equipment

1/26 • Construction of guiding-sheathings or guiding-tubes

1/28 • • with built-in bearings

3/00 Shafts (flexible shafts F16C 1/00; marine propeller shafts, paddle wheel shafts B63H 23/34)**; Axles; Cranks; Eccentrics**

3/02 • Shafts; Axles

3/03 • • telescopic

3/035 • • • with built-in bearings

3/04 • Crankshafts, eccentric-shafts; Cranks, eccentrics

3/06 • • Crankshafts

3/08 • • • made in one piece (features relating to lubrication F16C 3/14, to cooling F16C 3/16)

3/10 • • • assembled of several parts, e.g. by welding

3/12 • • • • releasably connected

3/14 • • • Features relating to lubrication

3/16 • • • Features relating to cooling

3/18 • • Eccentric-shafts

3/20 • • Shape of crankshafts or eccentric-shafts having regard to balancing
3/22 • • Cranks; Eccentrics (constructional features of crank-pins F16C 11/02)
3/24 • • • with return cranks, i.e. a second crank carried by the crank-pin
3/26 • • • Elastic crank-webs; Resiliently-mounted crank-pins
3/28 • • • Adjustable cranks or eccentrics
3/30 • • • with arrangements for overcoming dead-centres

5/00 Crossheads; Constructions of connecting-rod heads or piston-rod connections rigid with crossheads (piston-rods, i.e. rods rigidly connected to the piston, F16J 7/00)

7/00 Connecting-rods or like links pivoted at both ends (coupling-rods for locomotive driving-wheels B61C 17/10)**; Construction of connecting-rod heads** (heads rigid with crossheads F16C 5/00)
7/02 • Constructions of connecting-rods with constant length
7/04 • with elastic intermediate part or fluid cushion
7/06 • Adjustable connecting-rods
7/08 • made from sheet metal

9/00 Bearings for crankshafts or connecting-rods; Attachment of connecting-rods (lubrication of connecting-rods in connection with crankshafts F16C 3/14; connections to crossheads F16C 5/00, to pistons F16J 1/14)
9/02 • Crankshaft bearings
9/03 • • Arrangements for adjusting play
9/04 • Connecting-rod bearings; Attachment thereof
9/06 • • Arrangements for adjusting play in bearings, operating either automatically or not

11/00 Pivots; Pivotal connections (arrangements of steering linkage connections B62D 7/16)
11/02 • Trunnions; Crank-pins (fastening crank-pins to webs, crank-pins integral with cranks F16C 3/06, F16C 3/22)
11/04 • Pivotal connections (hinges for doors, windows or wings E05D)
11/06 • • Ball-joints; Other joints having more than one degree of angular freedom, i.e. universal joints (universal joints in which flexibility is produced by means of pivots or sliding or rolling connecting parts F16D 3/16)
11/08 • • • with resilient bearings
11/10 • • Arrangements for locking
11/12 • • incorporating flexible connections, e.g. leaf springs

13/00 Rolls, drums, discs, or the like (guide rollers in feeding webs B65H 27/00; calender rolls, bearings therefor D21G 1/02; rotary drums or rollers for heat-exchange or heat-transfer apparatus F28F 5/02; special adaptations, see the relevant classes)**; Bearings or mountings therefor**
13/02 • Bearings
13/04 • • Bearings with only partial enclosure of the member to be borne; Bearings with local support at two or more points
13/06 • • self-adjusting

15/00 Construction of rotary bodies to resist centrifugal force (flywheels, correction weights F16F 15/30, F16F 15/32)

Bearings for rotary parts (F16C 9/00, F16C 13/02 take precedence; allowing for linear movement also F16C 31/00)

17/00 Sliding-contact bearings for exclusively rotary movement (F16C 32/06 takes precedence; adjustable bearings F16C 23/00, F16C 25/00) **[2]**
17/02 • for radial load only
17/03 • • with tiltably-supported segments, e.g. Michell bearings
17/04 • for axial load only
17/06 • • with tiltably-supported segments, e.g. Michell bearings
17/08 • • for supporting the end face of a shaft or other member, e.g. footstep bearings
17/10 • for both radial and axial load
17/12 • characterised by features not related to the direction of the load
17/14 • • specially adapted for operating in water
17/18 • • with floating brasses or bushes, rotatable at a reduced speed
17/20 • • with emergency supports or bearings
17/22 • • with arrangements compensating for thermal expansion
17/24 • • with devices affected by abnormal or undesired conditions, e.g. for preventing overheating, for safety
17/26 • Systems consisting of a plurality of sliding-contact bearings

19/00 Bearings with rolling contact, for exclusively rotary movement (adjustable bearings F16C 23/00, F16C 25/00)
19/02 • with bearing balls essentially of the same size in one or more circular rows
19/04 • • for radial load mainly
19/06 • • • with a single row of balls
19/08 • • • with two or more rows of balls
19/10 • • for axial load mainly
19/12 • • • for supporting the end face of a shaft or other member, e.g. footstep bearings
19/14 • • for both radial and axial load
19/16 • • • with a single row of balls
19/18 • • • with two or more rows of balls
19/20 • • with loose spacing bodies, e.g. balls, between the bearing balls
19/22 • with bearing rollers essentially of the same size in one or more circular rows, e.g. needle bearings
19/24 • • for radial load mainly
19/26 • • • with a single row of rollers
19/28 • • • with two or more rows of rollers
19/30 • • for axial load mainly
19/32 • • • for supporting the end face of a shaft or other member, e.g. footstep bearings
19/34 • • for both radial and axial load
19/36 • • • with a single row of rollers
19/38 • • • with two or more rows of rollers
19/40 • • with loose spacing bodies between the rollers
19/44 • • Needle bearings
19/46 • • • with one row of needles
19/48 • • • with two or more rows of needles
19/49 • Bearings with both balls and rollers
19/50 • Other types of ball or roller bearings
19/52 • with devices affected by abnormal or undesired conditions
19/54 • Systems consisting of a plurality of bearings with rolling friction (spindle bearings F16C 35/08)

19/55 • • with intermediate floating rings rotating at reduced speed
19/56 • • in which the rolling bodies of one bearing differ in diameter from those of another

21/00 Combinations of sliding-contact bearings with ball or roller bearings, for exclusively rotary movement (F16C 17/24, F16C 19/52take precedence) **[2]**

23/00 Bearings for exclusively rotary movement adjustable for aligning or positioning (F16C 27/00 takes precedence)
23/02 • Sliding-contact bearings
23/04 • • self-adjusting
23/06 • Ball or roller bearings
23/08 • • self-adjusting
23/10 • Bearings, parts of which are eccentrically adjustable with respect to each other

25/00 Bearings for exclusively rotary movement adjustable for wear or play (F16C 27/00 takes precedence)
25/02 • Sliding-contact bearings
25/04 • • self-adjusting
25/06 • Ball or roller bearings
25/08 • • self-adjusting

27/00 Elastic or yielding bearings or bearing supports, for exclusively rotary movement (shock-damping bearings for watches or clocks G04B 31/02)
27/02 • Sliding-contact bearings
27/04 • Ball or roller bearings, e.g. with resilient rolling bodies
27/06 • by means of parts of rubber or like materials (F16C 27/08 takes precedence; with sliding surfaces of rubber or synthetic rubber F16C 33/22)
27/08 • primarily for axial load, e.g. for vertically-arranged shafts

29/00 Bearings for parts moving only linearly (F16C 32/06 takes precedence; incorporated in flexible shafts F16C 1/28) **[2]**
29/02 • Sliding-contact bearings
29/04 • Ball or roller bearings
29/06 • • in which the rolling bodies circulate partly without carrying load
29/08 • Arrangements for covering or protecting the ways
29/10 • Arrangements for locking the bearings
29/12 • Arrangements for adjusting play

31/00 Bearings for parts which both rotate and move linearly
31/02 • Sliding-contact bearings
31/04 • Ball or roller bearings
31/06 • • in which the rolling bodies circulate partly without carrying load

32/00 Bearings not otherwise provided for
32/02 • Knife-edge bearings
32/04 • using magnetic or electric supporting means **[2]**
32/06 • with moving member supported by a fluid cushion formed, at least to a large extent, otherwise than by movement of the shaft, e.g. hydrostatic air-cushion bearings **[2]**

Details or accessories of bearings

33/00 Parts of bearings; Special methods for making bearings or parts thereof (metal-working or like operations, see the relevant classes)
33/02 • Parts of sliding-contact bearings
33/04 • • Brasses; Bushes; Linings
33/06 • • • Sliding surface mainly made of metal (F16C 33/24-F16C 33/28 take precedence)
33/08 • • • • Attachment of brasses, bushes, or linings to the bearing housing
33/10 • • • • Construction relative to lubrication
33/12 • • • • Structural composition; Use of special materials or surface treatments, e.g. for rust-proofing
33/14 • • • • Special methods of manufacture; Running-in
33/16 • • • Sliding surface consisting mainly of graphite
33/18 • • • Sliding surface consisting mainly of wood or fibrous material
33/20 • • • Sliding surface consisting mainly of plastics (F16C 33/22-F16C 33/28 take precedence)
33/22 • • • Sliding surface consisting mainly of rubber or synthetic rubber (F16C 33/24-F16C 33/28 take precedence)
33/24 • • • with different areas of the sliding surface consisting of different materials
33/26 • • • made from wire coils; made from a number of discs, rings, rods, or other members
33/28 • • • with embedded reinforcements shaped as frames or meshed materials
33/30 • Parts of ball or roller bearings
33/32 • • Balls
33/34 • • Rollers; Needles
33/36 • • • with bearing-surfaces other than cylindrical, e.g. tapered; with grooves in the bearing surfaces
33/37 • • Loose spacing bodies
33/372 • • • rigid
33/374 • • • resilient
33/38 • • Ball cages
33/40 • • • for multiple rows of balls
33/41 • • • comb-shaped
33/42 • • • made from wire or sheet-metal strips (F16C 33/40, F16C 33/41 take precedence)
33/44 • • • Selection of substances (F16C 33/40, F16C 33/41 take precedence)
33/46 • • Cages for rollers or needles
33/48 • • • for multiple rows of rollers or needles
33/49 • • • comb-shaped
33/50 • • • formed of interconnected members, e.g. chains
33/51 • • • formed of unconnected members
33/52 • • • with no part entering between, or touching, the bearing surfaces of the rollers (F16C 33/50 takes precedence)
33/54 • • • made from wire, strips, or sheet metal (F16C 33/48, F16C 33/49 take precedence)
33/56 • • • Selection of substances (F16C 33/48, F16C 33/49 take precedence)
33/58 • • Raceways; Race rings
33/60 • • • divided
33/61 • • • • formed by wires
33/62 • • • Selection of substances
33/64 • • • Special methods of manufacture
33/66 • • Special parts or details in view of lubrication
33/72 • Sealings

33/74 • • of sliding-contact bearings
33/76 • • of ball or roller bearings
33/78 • • • with a diaphragm, disc, or ring, with or without resilient members
33/80 • • • Labyrinth sealings
33/82 • • • Arrangements for electrostatic or magnetic action against dust or other particles

35/00 Rigid support of bearing units; Housings, e.g. caps, covers (F16C 23/00 takes precedence)
35/02 • in the case of sliding-contact bearings
35/04 • in the case of ball or roller bearings
35/06 • • Mounting of ball or roller bearings; Fixing them onto shaft or in housing
35/063 • • • Fixing them on the shaft (with interposition of an element F16C 35/07) **[3]**
35/067 • • • Fixing them in a housing (with interposition of an element F16C 35/07) **[3]**
35/07 • • • Fixing them on the shaft or housing with interposition of an element **[3]**
35/073 • • • • between shaft and inner race ring **[3]**
35/077 • • • • between housing and outer race ring **[3]**
35/078 • • • using pressure fluid as mounting aid **[3]**
35/08 • for spindles
35/10 • • with sliding-contact bearings
35/12 • • with ball or roller bearings

37/00 Cooling of bearings

39/00 Relieving load on bearings
39/02 • using mechanical means
39/04 • using hydraulic or pneumatic means
39/06 • using magnetic means

41/00 Other accessories for bearings
41/02 • Arrangements for equalising the load on a plurality of bearings or their elements
41/04 • Preventing damage to bearings during storage or transport thereof or when otherwise out of use

43/00 Assembling bearings
43/02 • Assembling sliding-contact bearings
43/04 • Assembling rolling contact bearings
43/06 • • Placing rolling bodies in cages or bearings
43/08 • • • by deforming the cages or the races

F16D COUPLINGS FOR TRANSMITTING ROTATION (gearing for conveying rotation F16H, e.g. fluid gearing F16H 39/00-F16H 47/00)**; CLUTCHES** (dynamo-electric clutches H02K 49/00; clutches using electrostatic attraction H02N 13/00)**; BRAKES** (electrodynamic brake systems for vehicles in general B60L 7/00; dynamo-electric brakes H02K 49/00) **[2]**

Subclass index

Couplings

1/00 **Couplings for rigidly connecting two coaxial shafts or other movable machine elements** (for attachment of cranks to their shafts F16C 3/10)

1/02 • for connecting two abutting shafts or the like

1/027 • • non-disconnectable, e.g. involving gluing, welding or the like **[6]**

1/033 • • by clamping together two faces perpendicular to the axis of rotation, e.g. with bolted flanges **[6]**

1/04 • • with clamping hub; with hub and longitudinal key

1/05 • • • with radial clamping due to axial loading of at least one pair of conical surfaces **[5]**

1/06 • for attachment of a member on a shaft or on a shaft-end (attachment of marine propellers on shafts B63H 23/34)

1/064 • • non-disconnectable **[6]**

1/068 • • • involving gluing, welding or the like **[6]**

1/072 • • • involving plastic deformation (plastic welding F16D 1/068) **[6]**

1/076 • • by clamping together two faces perpendicular to the axis of rotation, e.g. with bolted flanges **[6]**

1/08 • • with clamping hub; with hub and longitudinal key

1/09 • • • with radial clamping due to axial loading of at least one pair of conical surfaces **[5]**

1/091 • • • • and comprising a chamber including a tapered piston moved axially by fluid pressure to effect clamping **[2006.01]**

1/092 • • • • the pair of conical mating surfaces being provided on the coupled hub and shaft **[2006.01]**

1/093 • • • • using one or more elastic or segmented conical rings forming at least one of the conical surfaces, the rings being expanded or contracted to effect clamping (F16D 1/091 takes precedence) **[2006.01]**

1/094 • • • • • using one or more pairs of elastic or segmented rings with mutually mating conical surfaces, one of the mating rings being contracted and the other being expanded **[2006.01]**

1/095 • • • • • with clamping effected by ring contraction only **[2006.01]**

1/096 • • • • • • the ring or rings being located between the shaft and the hub **[2006.01]**

1/097 • • • • • with clamping effected by ring expansion only, e.g. with an expanded ring located between hub and shaft **[2006.01]**

1/10 • Quick-acting couplings in which the parts are connected by simply bringing them together axially

1/104 • • having retaining means rotating with the coupling and acting only by friction **[6]**

1/108 • • having retaining means rotating with the coupling and acting by interengaging parts, i.e. positive coupling **[6]**

1/112 • • • the interengaging parts comprising torque-transmitting surfaces, e.g. bayonet joints **[6]**

1/116 • • • the interengaging parts including a continuous or interrupted circumferential groove in the surface of one of the coupling parts (circlips for retaining hubs on shafts F16B 21/18) **[6]**

1/12 • allowing adjustment of the parts about the axis (during motion F16D 3/10)

3/00 **Yielding couplings, i.e. with means permitting movement between the connected parts during the drive** (couplings disconnectable simply by axial movement F16D 1/10; slip couplings F16D 7/00; fluid couplings F16D 31/00-F16D 39/00)

3/02 • adapted to specific functions (universal joints, see the appropriate groups)

3/04 • • specially adapted to allow radial displacement, e.g. Oldham couplings

3/06 • • specially adapted to allow axial displacement

3/08 • • Couplings for intersecting shafts, provided with intermediate bars bent in an angle corresponding with the angle of intersection

3/10 • • Couplings with means for varying the angular relationship of two coaxial shafts during motion

3/12 • • specially adapted for accumulation of energy to absorb shocks or vibration (by making use of fluid elements F16D 3/80)

3/14 • • combined with a friction coupling for damping vibration or absorbing shock

3/16 • Universal joints in which flexibility is produced by means of pivots or sliding or rolling connecting parts

3/18 • • the coupling parts having slidably-interengaging teeth

Note(s)

In this group, the following expression is used with the meaning indicated:

- "coupling parts" means the driving member and the driven member of the coupling, which are mounted on, and rotate as a unit with, the shafts or their equivalents between which the coupling is placed. An intermediate member interconnecting these parts is regarded as such an equivalent.

3/19 • • • of resilient material or structure

3/20 • • one coupling part entering a sleeve of the other coupling part and connected thereto by sliding or rolling members (F16D 3/18, F16D 3/24 take precedence) **[4, 5]**

3/202 • • • one coupling part having radially projecting pins, e.g. tripod joints **[5]**

3/205 • • • • the pins extending radially outwardly from the coupling part **[5]**

3/207 • • • • the pins extending radially inwardly from the coupling part **[5]**

3/22 • • • the rolling members being balls, rollers, or the like, guided in grooves or sockets in both coupling parts **[3, 5]**

3/221 • • • • the rolling members being located in sockets in one of the coupling parts **[5]**

3/223 • • • • *the rolling members being guided in grooves in both coupling parts* ***[5, 2011.01]***

3/2233 • • • • • *where the track is made up of two curves with a point of inflexion in between, i.e. S-track joints* ***[2011.01]***

3/2237 • • • • • *where the grooves are composed of radii and adjoining straight lines, i.e. undercut free [UF] type joints* ***[2011.01]***

3/224 • • • • • *the groove centre-lines of each coupling part lying on a sphere* ***[5, 2011.01]***

3/2245 • • • • • • *where the groove centres are offset from the joint centre* ***[2011.01]***

3/226 • • • • • the groove centre-lines of each coupling part lying on a cylinder co-axial with the respective coupling part **[5]**

3/227 • • • • • • the joints being telescopic **[5]**

3/229 • • • • • Prismatic coupling parts having each groove centre-line lying on planes parallel to the axis of the respective coupling part (F16D 3/224, F16D 3/226 take precedence) **[5]**
3/24 • • comprising balls, rollers, or the like, between overlapping driving faces, e.g. cogs, on both coupling parts **[3, 5]**
3/26 • • Hooke's joints or other joints with an equivalent intermediate member to which each coupling part is pivotally or slideably connected (F16D 3/18, F16D 3/20 take precedence)
3/27 • • • with two or more intermediate members pivotally or slidably connected together, e.g. tongue-and-slipper type joints **[5]**
3/28 • • • in which the interconnecting pivots include elastic members
3/30 • • • in which the coupling is specially adapted to constant velocity-ratio
3/32 • • • • by the provision of two intermediate members each having two relatively-perpendicular trunnions or bearings
3/33 • • • • • with ball or roller bearings
3/34 • • • • parts being connected by ridges, pins, balls, or the like guided in grooves or between cogs
3/36 • • • in which each pivot between the coupling parts and the intermediate member comprises a single ball
3/38 • • • with a single intermediate member with trunnions or bearings arranged on two axes perpendicular to one another (F16D 3/36 takes precedence)
3/40 • • • • with intermediate member provided with two pairs of outwardly-directed trunnions on intersecting axes
3/41 • • • • • with ball or roller bearings
3/42 • • • • with ring-shaped intermediate member provided with bearings or inwardly-directed trunnions
3/43 • • • • • with ball or roller bearings
3/44 • • • the intermediate member being connected to the coupling parts by ridges, pins, balls, or the like guided in grooves or between cogs
3/46 • • • • each coupling part embracing grooves or ridges on the intermediate member
3/48 • • one coupling part having pins arranged parallel to the axis and entering holes in the other coupling part
3/50 • with the coupling parts connected by one or more intermediate members (F16D 3/16 takes precedence)
3/52 • • comprising a continuous strip, spring, or the like engaging the coupling parts at a number of places
3/54 • • Couplings comprising a chain or strip surrounding two wheels arranged side by side and provided with teeth or the equivalent
3/56 • • comprising elastic metal lamellae, elastic rods, or the like, e.g. arranged radially or parallel to the axis, the members being shear-loaded collectively by the total load
3/58 • • • the intermediate members being made of rubber or like material
3/60 • • comprising pushing or pulling links attached to both parts (F16D 3/64 takes precedence)
3/62 • • • the links or their attachments being elastic
3/64 • • comprising elastic elements arranged between substantially-radial walls of both coupling parts
3/66 • • • the elements being metallic, e.g. in the form of coils
3/68 • • • the elements being made of rubber or similar material
3/70 • • comprising elastic elements arranged in holes in one coupling part and surrounding pins on the other coupling part
3/72 • • with axially-spaced attachments to the coupling parts (F16D 3/56 takes precedence)
3/74 • • • the intermediate member or members being made of rubber or other flexible material
3/76 • • shaped as an elastic ring centered on the axis, surrounding a portion of one coupling part and surrounded by a sleeve of the other coupling part
3/77 • • • the ring being metallic
3/78 • • shaped as an elastic disc or flat ring, arranged perpendicular to the axis of the coupling parts, different sets of spots of the disc or ring being attached to each coupling part, e.g. Hardy couplings
3/79 • • • the disc or ring being metallic
3/80 • in which a fluid is used (fluid couplings allowing continuous slip F16D 31/00-F16D 35/00)
3/82 • • with a coupling element in the form of a pneumatic tube
3/84 • Shrouds, e.g. casings, covers; Sealing means specially adapted therefor

5/00 **Impulse couplings, i.e. couplings that alternately accelerate and decelerate the driven member** (fluid couplings F16D 31/00-F16D 39/00)

7/00 **Slip couplings, e.g. slipping on overload, for absorbing shock** (combined with yielding shaft couplings F16D 3/14; fluid slip couplings F16D 31/00-F16D 35/00)
7/02 • of the friction type (couplings in which overload initiates a decrease of coupling pressure or a disconnection, see the relevant groups for clutches)
7/04 • of the ratchet type
7/06 • • with intermediate balls or rollers
7/08 • • • moving axially between engagement and disengagement **[5]**
7/10 • • • moving radially between engagement and disengagement **[5]**

9/00 **Couplings with safety member for disconnecting**
9/02 • by thermal means, e.g. melting member **[6]**
9/04 • by tensile breaking **[6]**
9/06 • by breaking due to shear stress **[6]**
9/08 • • over a single area encircling the axis of rotation, e.g. shear necks on shafts (F16D 9/10 takes precedence) **[6]**
9/10 • • having a part movable after disconnection so as to provide reconnection, e.g. advanceable shear pins **[6]**

Clutches with mechanically-actuated clutching members; Synchronisation arrangements for clutches

11/00 **Clutches in which the members have interengaging parts** (arrangements for synchronisation F16D 23/02; automatic clutches F16D 43/00-F16D 45/00; external control F16D 48/00)
11/02 • disengaged by a contact of a part mounted on the clutch with a stationarily-mounted member
11/04 • • with clutching members movable only axially

11/06 • • with clutching members movable otherwise than only axially, e.g. rotatable keys
11/08 • actuated by moving a non-rotating part axially (actuating-mechanisms in the relevant groups)
11/10 • • with clutching members movable only axially
11/12 • • with clutching members movable otherwise than only axially
11/14 • with clutching members movable only axially (F16D 11/02, F16D 11/08 take precedence) **[5]**
11/16 • with clutching members movable otherwise than only axially (F16D 11/02, F16D 11/08 take precedence) **[5]**

13/00 **Friction clutches** (arrangements for synchronisation F16D 23/02; automatic clutches F16D 43/00-F16D 45/00; external control F16D 48/00)
13/02 • disengaged by the contact of a part mounted on the clutch with a stationarily-mounted member
13/04 • with means for actuating or keeping engaged by a force derived at least partially from one of the shafts to be connected (automatic clutches F16D 43/00)
13/06 • • with clutching members movable otherwise than only axially (F16D 13/08, F16D 13/12 take precedence)
13/08 • with a helical band or equivalent member, which may be built-up from linked parts, with more than one turn embracing a drum or the like, with or without an additional clutch actuating the end of the band (F16D 13/02 takes precedence)
13/10 • with clutching members co-operating with the periphery of a drum, a wheel-rim, or the like (F16D 13/02-F16D 13/08 take precedence)
13/12 • with an expansible band or coil co-operating with the inner surface of a drum or the like (F16D 13/02 takes precedence)
13/14 • with outwardly-movable clutching members co-operating with the inner surface of a drum or the like (F16D 13/02, F16D 13/06, F16D 13/12 take precedence)
13/16 • • shaped as radially-movable segments
13/18 • • shaped as linked or separately-pivoted segments
13/20 • with clutching members co-operating with both the periphery and the inner surface of a drum or wheel-rim
13/22 • with axially-movable clutching members
13/24 • • with conical friction surfaces
13/26 • • • in which the or each axially-movable member is pressed exclusively against an axially-located member
13/28 • • • • with means for increasing the effective force between the actuating sleeve or equivalent member and the pressure member
13/30 • • • • • in which the clutching pressure is produced by springs only
13/32 • • • in which two or more axially-movable members are pressed from one side towards an axially-located member
13/34 • • • • with means for increasing the effective force between the actuating sleeve or equivalent member and the pressure member
13/36 • • • • • in which the clutching pressure is produced by springs only
13/38 • • with flat clutching surfaces, e.g. discs
13/40 • • • in which the or each axially-movable member is pressed exclusively against an axially-located member
13/42 • • • • with means for increasing the effective force between the actuating sleeve or equivalent member and the pressure member
13/44 • • • • • in which the clutching pressure is produced by springs only
13/46 • • • in which two axially-movable members, of which one is attached to the driving side and the other to the driven side, are pressed from one side towards an axially-located member
13/48 • • • • with means for increasing the effective force between the actuating sleeve or equivalent member and the pressure member
13/50 • • • • • in which the clutching pressure is produced by springs only
13/52 • • • Clutches with multiple lamellae
13/54 • • • • with means for increasing the effective force between the actuating sleeve or equivalent member and the pressure member
13/56 • • • • • in which the clutching pressure is produced by springs only
13/58 • Details
13/60 • • Clutching elements (friction lining or attachment thereof F16D 69/00)
13/62 • • • Clutch-bands; Clutch-shoes; Clutch-drums (brake-bands, brake-shoes, brake-drums F16D 65/00)
13/64 • • • Clutch-plates; Clutch-lamellae (brake-plates, brake-lamellae F16D 65/12)
13/66 • • • • of conical shape
13/68 • • • • Attachments of plates or lamellae to their supports
13/69 • • • • Arrangements for spreading lamellae in released state
13/70 • • Pressure members, e.g. pressure plates, for clutch-plates or lamellae; Guiding arrangements for pressure members
13/71 • • • in which the clutching pressure is produced by springs only
13/72 • • Features relating to cooling
13/74 • • Features relating to lubrication
13/75 • • Features relating to adjustment, e.g. slack adjusters
13/76 • specially adapted to incorporate with other transmission parts, i.e. at least one of the clutch parts also having another function, e.g. being the disc of a pulley

15/00 **Clutches with wedging balls or rollers or with other wedgeable separate clutching members** (freewheels, freewheel clutches F16D 41/00; automatic clutches F16D 43/00-F16D 45/00; external control F16D 48/00)

17/00 **Clutches in which the drive is transmitted solely by virtue of the eccentricity of the contacting surfaces of clutch members which fit one around the other** (automatic clutches F16D 43/00-F16D 45/00; external control F16D 48/00)

19/00 **Clutches with mechanically-actuated clutching members not otherwise provided for** (automatic clutches F16D 43/00-F16D 45/00; external control F16D 48/00)

21/00 **Systems comprising a plurality of mechanically-actuated clutches** (for synchronisation F16D 23/04; automatic clutches F16D 43/00-F16D 45/00; external control F16D 48/00)
21/02 • for interconnecting three or more shafts or other transmission members in different ways

21/04 • • with a shaft carrying a number of rotatable transmission members, e.g. gears, each of which can be connected to the shaft by a clutching member or members between the shaft and the hub of the transmission member

21/06 • • at least two driving shafts or two driven shafts being concentric

21/08 • Serially-arranged clutches interconnecting two shafts only when all the clutches are engaged (F16D 13/08, F16D 13/12 take precedence)

23/00 Details of mechanically-actuated clutches not specific for one distinct type; Synchronisation arrangements for clutches

23/02 • Arrangements for synchronisation (shape or mounting of interengaging parts of clutch members to facilitate engagement F16D 11/08)

23/04 • • with an additional friction cluch

23/06 • • • and a blocking mechanism preventing the engagement of the main clutch prior to synchronisation

23/08 • • with a blocking mechanism that only releases the clutching member on synchronisation (in combination with an additional friction clutch F16D 23/06)

23/10 • • automatically producing the engagement of the clutch when the clutch members are moving at the same speed; Indicating synchronisation

23/12 • Mechanical clutch-actuating mechanisms arranged outside the clutch as such (specific for combined clutches F16D 21/00; mechanisms specific for synchronisation F16D 23/02)

23/14 • • Clutch-actuating sleeves; Actuating members directly connected to clutch-actuating sleeves

Clutches actuated non-mechanically [3]

25/00 Fluid-actuated clutches (arrangements for synchronisation F16D 23/02; fluid clutches F16D 31/00-F16D 39/00; automatic clutches F16D 43/00-F16D 45/00; external control F16D 48/00)

25/02 • with means for actuating or keeping engaged by a force derived at least partially from one of the shafts to be connected

25/04 • in which the fluid actuates an elastic clutching member, e.g. a diaphragm or a pneumatic tube (F16D 25/02 takes precedence; coupling using a pneumatic tube F16D 3/82)

25/06 • in which the fluid actuates a piston incorporated in the clutch (F16D 25/02 takes precedence)

25/061 • • the clutch having interengaging clutch members

25/062 • • the clutch having friction surfaces

25/063 • • • with clutch members exclusively moving axially

25/0632 • • • • with conical friction surfaces, e.g. cone clutches **[5]**

25/0635 • • • • with flat friction surfaces, e.g. discs **[5]**

25/0638 • • • • • with more than two discs, e.g. multiple lamellae **[5]**

25/064 • • • • the friction surface being grooved

25/065 • • • with clutching members having a movement which has at least a radial component

25/08 • with fluid-actuated member not rotating with a clutching member (F16D 25/02 takes precedence)

25/10 • Clutch systems with a plurality of fluid-actuated clutches

25/12 • Details not specific to one of the before-mentioned types

27/00 Magnetically-actuated clutches; Control or electric circuits therefor (arrangements for synchronisation F16D 23/02; clutches with magnetisable particles F16D 37/02; automatic clutches F16D 43/00-F16D 45/00; circuits for external control F16D 48/00) **[2]**

27/01 • with permanent magnets

27/02 • with electromagnets incorporated in the clutch, i.e. with collecting rings

27/04 • • with axially-movable friction surfaces

27/06 • • • with friction surfaces arranged within the flux

27/07 • • • • Constructional features of clutch-plates or clutch-lamellae

27/08 • • • with friction surfaces arranged externally to the flux

27/09 • • and with interengaging jaws or gear-teeth

27/10 • with an electromagnet not rotating with a clutching member, i.e. without collecting rings

27/102 • • with radially movable clutching members (F16D 27/105 takes precedence) **[5]**

27/105 • • with a helical band or equivalent member co-operating with a cylindrical coupling surface **[5]**

27/108 • • with axially movable clutching members **[5]**

27/11 • • • with conical friction surfaces, e.g. cone clutches **[5]**

27/112 • • • with flat friction surfaces, e.g. discs **[5]**

27/115 • • • • with more than two discs, e.g. multiple lamellae **[5]**

27/118 • • with interengaging jaws or gear teeth **[5]**

27/12 • Clutch systems with a plurality of electromagnetically-actuated clutches

27/14 • Details

28/00 Electrically-actuated clutches (arrangements for synchronisation F16D 23/02; clutches actuated directly by means of an electromagnet F16D 27/00; automatic clutches F16D 43/00-F16D 45/00; external control F16D 48/00) **[6]**

29/00 Clutches or systems of clutches involving both fluid and magnetic or both fluid and electric actuation [6]

Couplings or clutches with a fluid or semifluid as power-transmitting means

31/00 Fluid couplings or clutches with pumping sets of the volumetric type, i.e. in the case of liquid passing a predetermined volume per revolution

31/02 • using pumps with pistons or plungers working in cylinders

31/04 • using gear-pumps

31/06 • using pumps of types differing from those before-mentioned

31/08 • Control of slip

33/00 Rotary fluid couplings or clutches of the hydrokinetic type

33/02 • controlled by changing the flow of the liquid in the working circuit, while maintaining a completely filled working circuit

33/04 • • by altering the position of blades

33/06 • controlled by changing the amount of liquid in the working circuit

33/08 • • by devices incorporated in the fluid coupling, with or without remote control
33/10 • • • consisting of controllable supply and discharge openings
33/12 • • • • controlled automatically by self-actuated valves
33/14 • • • consisting of shiftable or adjustable scoops
33/16 • • by means arranged externally of the coupling or clutch
33/18 • Details
33/20 • • Shape of wheels, blades, or channels with respect to function

35/00 Fluid clutches in which the clutching is predominantly obtained by fluid adhesion (F16D 37/00 takes precedence)
35/02 • with rotary working chambers and rotary reservoirs, e.g. in one coupling part **[5]**

37/00 Clutches in which the drive is transmitted through a medium consisting of small particles, e.g. centrifugally speed-responsive
37/02 • the particles being magnetisable

39/00 Combinations of couplings according to two or more of the groups F16D 31/00-F16D 37/00

Freewheels or freewheel clutches; Automatic clutches

Note(s) [2009.01]

Groups F16D 31/00-F16D 39/00take precedence over groups F16D 41/00-F16D 45/00.

41/00 Freewheels or freewheel clutches (cycle brakes controlled by back-pedalling B62L 5/00)
41/02 • disengaged by contact of a part of or on the freewheel or freewheel clutch with a stationarily-mounted member
41/04 • combined with a clutch for locking the driving and driven members (F16D 41/02, F16D 41/24 take precedence)
41/06 • with intermediate wedging coupling members between an inner and an outer surface (F16D 41/02, F16D 41/24 take precedence)
41/061 • • the intermediate members wedging by movement having an axial component **[6]**
41/063 • • the intermediate members wedging by moving along the inner and the outer surface without pivoting or rolling, e.g. sliding wedges (F16D 41/061 takes precedence) **[6]**
41/064 • • the intermediate members wedging by rolling and having a circular cross-section, e.g. balls (F16D 41/061 takes precedence) **[6]**
41/066 • • • all members having the same size and only one of the two surfaces being cylindrical **[6]**
41/067 • • • • and the members being distributed by a separate cage encircling the axis of rotation **[6]**
41/069 • • the intermediate members wedging by pivoting or rocking, e.g. sprags (F16D 41/061 takes precedence) **[6]**
41/07 • • • between two cylindrical surfaces **[6]**
41/08 • • with provision for altering the freewheeling action
41/10 • • • with self-actuated reversing
41/12 • with hinged pawl co-operating with teeth, cogs, or the like (F16D 41/02, F16D 41/24 take precedence)
41/14 • • the effective stroke of the pawl being adjustable
41/16 • • the action being reversible
41/18 • with non-hinged detent (F16D 41/02, F16D 41/24 take precedence)
41/20 • with expandable or contractable clamping ring or band (F16D 41/02, F16D 41/24 take precedence)
41/22 • with clutching ring or disc axially shifted as a result of lost motion between actuating members (F16D 41/02, F16D 41/24 take precedence)
41/24 • specially adapted for cycles
41/26 • • with provision for altering the action
41/28 • • with intermediate wedging coupling members
41/30 • • with hinged pawl co-operating with teeth, cogs, or the like
41/32 • • with non-hinged detent
41/34 • • with expandable or contractable clamping ring or band
41/36 • • with clutching ring or disc axially shifted as a result of lost motion between actuating members

43/00 Internally controlled automatic clutches (freewheels, freewheel clutches F16D 41/00; external control of clutches F16D 48/00) **[6]**
43/02 • actuated entirely mechanically
43/04 • • controlled by angular speed (F16D 43/24 takes precedence; clutches in which the drive is transmitted through a medium consisting of small particles F16D 37/00)
43/06 • • • with centrifugal masses actuating axially a movable pressure ring or the like
43/08 • • • • the pressure ring actuating friction plates, cones, or similar axially-movable friction surfaces
43/09 • • • • • in which the carrier of the centrifugal masses can be stopped
43/10 • • • • • the centrifugal masses acting directly on the pressure ring, no other actuating mechanism for the pressure ring being provided
43/12 • • • • • the centrifugal masses acting on, or forming a part of, an actuating mechanism by which the pressure ring can also be actuated independently of the masses
43/14 • • • with centrifugal masses actuating the clutching members directly in a direction which has at least a radial component; with centrifugal masses themselves being the clutching members
43/16 • • • • with clutching members having interengaging parts
43/18 • • • • with friction clutching members
43/20 • • controlled by torque, e.g. overload-release clutches, slip-clutches with means by which torque varies the clutching pressure
43/202 • • • of the ratchet type (slip couplings of the ratchet type F16D 7/04) **[5]**
43/204 • • • • with intermediate balls or rollers **[5]**
43/206 • • • • • moving axially between engagement and disengagement **[5]**
43/208 • • • • • moving radially between engagement and disengagement **[5]**
43/21 • • • with friction members
43/22 • • controlled by both speed and torque
43/24 • • controlled by acceleration or deceleration of angular speed
43/25 • • controlled by thermo-responsive elements

43/26 • • acting at definite angular position or disengaging after a definite number of rotations (actuating by means of stationary abutment F16D 11/02, F16D 13/02, F16D 15/00)
43/28 • actuated by fluid pressure
43/284 • • controlled by angular speed
43/286 • • controlled by torque
43/30 • Systems of a plurality of automatic clutches

45/00 Freewheels or freewheel clutches combined with automatic clutches

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47/00 Systems of clutches, or clutches and couplings, comprising devices of types grouped under at least two of the following sets of groups: F16D 1/00-F16D 9/00; F16D 11/00-F16D 23/00; F16D 25/00-F16D 29/00; F16D 31/00-F16D 39/00; F16D 41/00-F16D 45/00 (freewheels combined with a clutch to lock the driving and driven members of the freewheel F16D 41/04, F16D 41/26)

47/02 • of which at least one is a coupling (elastic attachment of clutch parts, see the relevant groups for clutches)
47/04 • of which at least one is a freewheel (F16D 47/02, F16D 47/06 take precedence)
47/06 • of which at least one is a clutch with a fluid or a semifluid as power-transmitting means

48/00 External control of clutches [6]

Note(s)

This group does not cover actuation, which is covered by groups F16D 11/00-F16D 29/00.

48/02 • Control by fluid pressure **[6]**
48/04 • • providing power assistance **[6]**
48/06 • Control by electric or electronic means, e.g. of fluid pressure **[6]**
48/08 • • Regulating clutch take-up on starting **[6]**
48/10 • • Preventing unintentional or unsafe engagement **[6]**
48/12 • • Control of torque transfer between driven axles **[6]**

Brakes

49/00 Brakes with a braking member co-operating with the periphery of a drum, wheel-rim, or the like

49/02 • shaped as a helical band or coil with more than one turn, with or without intensification of the braking force by the tension of the band or contracting member
49/04 • • mechanically actuated
49/06 • • fluid actuated
49/08 • shaped as an encircling band extending over approximately 360°
49/10 • • mechanically actuated (self-tightening F16D 49/20)
49/12 • • fluid actuated
49/14 • shaped as a fluid-filled flexible member actuated by variation of the fluid pressure
49/16 • Brakes with two brake-blocks (self-tightening F16D 49/20)
49/18 • Brakes with three or more brake-blocks (self-tightening F16D 49/20)
49/20 • Self-tightening brakes (with helical band or coil with more than one turn F16D 49/02)
49/22 • • with an auxiliary friction member initiating or increasing the action of the brake

51/00 Brakes with outwardly-movable braking members co-operating with the inner surface of a drum or the like

51/02 • shaped as one or more circumferential bands
51/04 • • mechanically actuated
51/06 • • fluid actuated
51/08 • shaped as an expansible fluid-filled flexible member
51/10 • shaped as exclusively radially-movable brake-shoes
51/12 • • mechanically actuated
51/14 • • fluid actuated
51/16 • shaped as brake-shoes pivoted on a fixed or nearly-fixed axis (self-tightening F16D 51/46)
51/18 • • with two brake-shoes
51/20 • • • extending in opposite directions from their pivots
51/22 • • • • mechanically actuated
51/24 • • • • fluid actuated
51/26 • • • both extending in the same direction from their pivots
51/28 • • • • mechanically actuated
51/30 • • • • fluid actuated
51/32 • • with three or more brake-shoes
51/34 • • • extending in opposite directions from their pivots
51/36 • • • • mechanically actuated
51/38 • • • • fluid actuated
51/40 • • • all extending in the same direction from their pivots
51/42 • • • • mechanically actuated
51/44 • • • • fluid actuated
51/46 • Self-tightening brakes with pivoted brake-shoes
51/48 • • with two linked or directly-interacting brake-shoes
51/50 • • • mechanically actuated
51/52 • • • fluid actuated
51/54 • • with three or more brake-shoes, at least two of them being linked or directly interacting
51/56 • • • mechanically actuated
51/58 • • • fluid actuated
51/60 • • with wedging action of a brake-shoe, e.g. the shoe entering as a wedge between the brake-drum and a stationary part
51/62 • • • mechanically actuated
51/64 • • • fluid actuated
51/66 • • an actuated brake-shoe being carried along and thereby engaging a member for actuating another brake-shoe
51/68 • • • mechanically actuated
51/70 • • • fluid actuated

53/00 Brakes with braking members co-operating with both the periphery and the inner surface of a drum, wheel-rim, or the like

55/00 Brakes with substantially-radial braking surfaces pressed together in axial direction, e.g. disc brakes

55/02 • with axially-movable discs or pads pressed against axially-located rotating members
55/04 • • by moving discs or pads away from one another against radial walls of drums or cylinders
55/06 • • • without self-tightening action
55/08 • • • • Mechanically-actuated brakes
55/10 • • • • Brakes actuated by a fluid-pressure device arranged in or on the brake
55/12 • • • • • comprising an expansible fluid-filled flexible member coaxial with the brake

55/14 • • • with self-tightening action, e.g. by means of coacting helical surfaces or balls and inclined surfaces
55/15 • • • • initiated by means of brake-bands or brake-shoes
55/16 • • • • Mechanically-actuated brakes
55/18 • • • • Brakes actuated by a fluid-pressure device arranged in or on the brake
55/20 • • • • • comprising an expansible fluid-filled flexible member coaxial with the brake
55/22 • • by clamping an axially-located rotating disc between movable braking members, e.g. movable brake discs or brake pads **[5]**
55/224 • • • with a common actuating member for the braking members **[5]**
55/225 • • • • the braking members being brake pads **[5]**
55/2255 • • • • • in which the common actuating member is pivoted **[5]**
55/226 • • • • • in which the common actuating member is moved axially **[5]**
55/2265 • • • • • • the axial movement being guided by one or more pins **[5]**
55/227 • • • • • • • by two pins **[5]**
55/228 • • • with a separate actuating member for each side
55/24 • with a plurality of axially-movable discs, lamellae, or pads, pressed from one side towards an axially-located member
55/26 • • without self-tightening action
55/28 • • • Brakes with only one rotating disc
55/30 • • • • mechanically actuated
55/31 • • • • • by means of an intermediate leverage
55/32 • • • • actuated by a fluid-pressure device arranged in or on the brake
55/33 • • • • • by means of an intermediate leverage
55/34 • • • • • comprising an expansible fluid-filled flexible member coaxial with the brake
55/36 • • • Brakes with a plurality of rotating discs all lying side by side
55/38 • • • • mechanically actuated
55/39 • • • • • by means of an intermediate leverage
55/40 • • • • actuated by a fluid-pressure device arranged in or on the brake
55/41 • • • • • by means of an intermediate leverage
55/42 • • • • • comprising an expansible fluid-filled flexible member coaxial with the brake
55/44 • • • with the rotating part consisting of both central plates and ring-shaped plates arranged concentrically around the central plates
55/46 • • with self-tightening action
55/48 • • • with discs or pads having a small free angular travel relative to their support, which produces the self-tightening action
55/50 • • • with auxiliary friction members, which may be of different type, producing the self-tightening action

57/00 Liquid-resistance brakes; Air-resistance brakes
57/02 • with blades or like members braked by the fluid
57/04 • with blades causing a directed flow, e.g. Föttinger type
57/06 • comprising a pump circulating fluid, braking being effected by throttling of the circulation

59/00 Self-acting brakes, e.g. coming into operation at a predetermined speed
59/02 • spring-loaded and adapted to be released by mechanical, fluid, or electromagnetic means

61/00 Brakes with means for making the energy absorbed available for use (F16D 57/00 takes precedence)

63/00 Brakes not otherwise provided for; Brakes combining more than one of the types of groups F16D 49/00-F16D 61/00 (brakes with auxiliary members for self-tightening F16D 49/22, F16D 51/66, F16D 55/50)

65/00 Parts or details of brakes
65/02 • Braking members; Mounting thereof (friction linings or attachment thereof F16D 69/00)
65/04 • • Bands, shoes or pads; Pivots or supporting members therefor **[5]**
65/06 • • • for externally-engaging brakes
65/08 • • • for internally-engaging brakes
65/09 • • • • Pivots or supporting members therefor **[2]**
65/092 • • • for axially-engaging brakes, e.g. disc brakes **[5]**
65/095 • • • • Pivots or supporting members therefor **[5]**
65/097 • • • • • Resilient means interposed between pads and supporting members **[5]**
65/10 • • Drums for externally- or internally-engaging brakes
65/12 • • Discs; Drums for disc brakes
65/14 • Actuating mechanisms for brakes; Means for initiating operation at a predetermined position (brake control systems, parts thereof B60T)
65/16 • • arranged in or on the brake
65/18 • • • adapted for drawing members together
65/20 • • • • comprising a fluid-pressure device
65/21 • • • • acting by electric or magnetic means **[2]**
65/22 • • • adapted for pressing members apart
65/24 • • • • comprising a fluid-pressure device
65/26 • • • • • in the form of a fluid-filled flexible member
65/27 • • • • acting by electric or magnetic means **[2]**
65/28 • • arranged apart from the brake
65/30 • • • acting mechanically
65/32 • • • acting by fluid means
65/34 • • • acting by electric or magnetic means (holding devices using electrostatic attraction H02N 13/00) **[2]**
65/35 • • • • including a permanent magnet **[3]**
65/36 • • • acting by both fluid and electric means
65/38 • Slack adjusters
65/40 • • mechanical
65/42 • • • non-automatic
65/44 • • • • by means of direct linear adjustment (F16D 65/46, F16D 65/48 take precedence)
65/46 • • • • with screw-thread and nut
65/48 • • • • with eccentric or helical body
65/50 • • • • for angular adjustment of two concentric parts of the brake control system
65/52 • • • self-acting in one direction for adjusting excessive play
65/54 • • • • by means of direct linear adjustment (F16D 65/56, F16D 65/58 take precedence)
65/56 • • • • with screw-thread and nut
65/58 • • • • with eccentric or helical body
65/60 • • • • for angular adjustment of two concentric parts of the brake control system
65/62 • • • self-acting in both directions for adjusting excessive and insufficient play
65/64 • • • • by means of direct linear adjustment (F16D 65/66, F16D 65/68 take precedence)
65/66 • • • • with screw-thread and nut

65/68 • • • • with eccentric or helical body
65/70 • • • • for angular adjustment of two concentric parts of the brake control system
65/72 • • hydraulic
65/74 • • • self-acting in one direction
65/76 • • • self-acting in both directions
65/78 • Features relating to cooling
65/80 • • for externally-engaging brakes
65/807 • • • with open cooling system, e.g. cooled by air **[2]**
65/813 • • • with closed cooling system **[2]**
65/82 • • for internally-engaging brakes
65/827 • • • with open cooling system, e.g. cooled by air **[2]**
65/833 • • • with closed cooling system **[2]**
65/84 • • for disc brakes
65/847 • • • with open cooling system, e.g. cooled by air **[2]**
65/853 • • • with closed cooling system **[2]**

66/00 Arrangements for monitoring working conditions of brakes, e.g. wear or temperature
66/02 • Apparatus for indicating wear

67/00 Combinations of couplings and brakes; Combinations of clutches and brakes (F16D 71/00 takes precedence; conjoint control of brake systems and driveline clutches in vehicles B60W 10/02, B60W 10/18) **[2]**
67/02 • Clutch-brake combinations
67/04 • • fluid actuated
67/06 • • electromagnetically actuated

69/00 Friction linings; Attachment thereof; Selection of coacting friction substances or surfaces (braking members F16D 65/02)
69/02 • Composition of linings (chemical aspects, see the relevant classes)
69/04 • Attachment of linings

71/00 Mechanisms for bringing members to rest in a predetermined position (combined with, or controlling, clutches F16D 43/26; means for initiating operation of brakes at a predetermined position F16D 65/14)
71/02 • comprising auxiliary means for producing the final movement
71/04 • providing for selection between a plurality of positions (F16D 71/02 takes precedence)

F16F SPRINGS; SHOCK-ABSORBERS; MEANS FOR DAMPING VIBRATION

Note(s)

1. This subclass covers:
   - springs, shock-absorbers or vibration-dampers;
   - their arrangement in, or adaptation for, particular apparatus, if not provided for in the subclasses covering said apparatus.
2. This subclass does not cover the arrangement or adaptation of springs, shock-absorbers or vibration-dampers in, or for, particular apparatus, if provided for in the subclasses concerning the said apparatus, e.g.

A47C 23/00-A47C 27/00.....Spring mattresses
A63C 5/075.....Vibration dampers in skis
B60G.....Vehicle suspensions
B60R 19/24.....Mounting of bumpers on vehicles
B61F.....Rail vehicle suspensions
B61G 11/00.....Buffers for railway or tramway vehicles
B62D 21/15.....Vehicle chassis frames having impact absorbing means
B62J 1/02.....Resiliently mounted saddles on cycles
B62K 21/08.....Steering dampers
B63H 1/15.....Marine propellers having vibration-damping means
B63H 21/30.....Anti-vibration mounting of marine propulsion plant in ships
B64C 25/58.....Arrangement of shock-absorbers or springs in aeroplane alighting gear
B65D 81/02.....Containers, packing elements or packages with shock-absorbing means
D06F 37/20.....Resilient mountings in washing machines
D06F 49/06.....Resilient mountings in domestic spin-dryers
F03G 1/00.....Spring motors
F21V 15/04.....Resilient mounting of lighting devices
F41A 25/00.....Gun cradles to permit recoil
F41B 5/20.....Vibration dampers for archery bows
G01D 11/00.....Indicating or recording in connection with measuring
G01G 21/10.....Weighing apparatus, e.g. arrangement of shock-absorbers in weighing apparatus
G04B.....Clocks, watches
G12B 3/08.....Damping of movements in instruments
G21C 7/20.....Disposition of shock-absorbing devices for displacable control elements in nuclear reactors.

Subclass index

1/00 **Springs** (working with fluid F16F 5/00, F16F 9/00)
1/02 • made of steel or other material having low internal friction (F16F 1/36 takes precedence); Wound, torsion, leaf, cup, ring or the like springs, the material of the spring not being relevant **[6]**
1/04 • • Wound springs
1/06 • • • with turns lying in cylindrical surfaces
1/08 • • • with turns lying in mainly conical surfaces
1/10 • • • Spiral springs with turns lying substantially in plane surfaces
1/12 • • • Attachments or mountings
1/13 • • • • comprising inserts or spacers between the windings for changing the mechanical or physical characteristics of the spring **[6]**
1/14 • • Torsion springs consisting of bars or tubes
1/16 • • • Attachments or mountings
1/18 • • Leaf springs
1/20 • • • with layers, e.g. anti-friction layers, or with rollers between the leaves
1/22 • • • with means for modifying the spring characteristic
1/24 • • • Lubrication; Covers, e.g. for retaining lubricant
1/26 • • • Attachments or mountings (B60G 11/10 takes precedence) **[5]**
1/28 • • • • comprising cylindrical metal pins pivoted in close-fitting sleeves
1/30 • • • • comprising intermediate pieces made of rubber or similar elastic material
1/32 • • Cup springs; Dished disc springs (diaphragms F16J 3/00)
1/34 • • Ring springs, i.e. annular bodies deformed radially due to axial load
1/36 • made of plastics, e.g. rubber; made of material having high internal friction
1/362 • • made of steel wool or compressed hair **[6]**
1/364 • • made of cork, wood or the like material **[6]**
1/366 • • made of fibre reinforced plastics **[6]**
1/368 • • • Leaf springs **[6]**
1/37 • • of foam-like material, e.g. sponge rubber
1/371 • • characterised by inserts or auxiliary extension elements, e.g. for rigidification (F16F 1/366, F16F 1/387 take precedence) **[6]**
1/373 • • characterised by having a particular shape **[6]**
1/374 • • • having a spherical or the like shape **[6]**
1/376 • • • having projections, studs, serrations or the like on at least one surface (F16F 1/387 takes precedence) **[6]**
1/377 • • • having holes or openings (F16F 1/387 takes precedence) **[6]**
1/379 • • characterised by arrangements for regulating the spring temperature, e.g. by cooling **[6]**
1/38 • • with a sleeve of elastic material between a rigid outer sleeve and a rigid inner sleeve or pin
1/387 • • • comprising means for modifying the rigidity in particular directions **[6]**
1/393 • • • with spherical or conical sleeves **[6]**
1/40 • • consisting of a stack of similar elements separated by non-elastic intermediate layers
1/41 • • • the spring consisting of generally conically arranged elements **[6]**
1/42 • • characterised by the mode of stressing
1/44 • • • loaded mainly in compression
1/46 • • • loaded mainly in tension
1/48 • • • loaded mainly in torsion
1/50 • • • loaded mainly in shear
1/52 • • • loaded in combined stresses
1/54 • • • • loaded in compression and shear

3/00 **Spring units consisting of several springs, e.g. for obtaining a desired spring characteristic** (including fluid springs F16F 5/00, F16F 13/00)
3/02 • with springs made of steel or of other material having low internal friction
3/04 • • composed only of wound springs
3/06 • • • of which some are placed around others in such a way that they damp each other by mutual friction
3/07 • • combined with chambers filled with gas or liquid
3/08 • with springs made of a material having high internal friction, e.g. rubber
3/087 • • Units comprising several springs made of plastics or the like material (F16F 1/40 takes precedence) **[6]**
3/093 • • • the springs being of different materials, e.g. having different types of rubber **[6]**
3/10 • • combined with springs made of steel or other material having low internal friction
3/12 • • • the steel spring being in contact with the rubber spring, e.g. being embedded in it **[6]**

5/00 **Liquid springs in which the liquid works as a spring by compression, e.g. combined with throttling action; Combinations of devices including liquid springs**

6/00 **Magnetic springs; Fluid magnetic springs**

7/00 **Vibration-dampers; Shock-absorbers** (using fluid F16F 5/00, F16F 9/00; specific for rotary systems F16F 15/10)
7/01 • using friction between loose particles, e.g. sand **[6]**
7/02 • with relatively-rotatable friction surfaces that are pressed together (F16F 7/01 takes precedence; one of the members being a spring F16F 13/02) **[6]**
7/04 • • in the direction of the axis of rotation
7/06 • • in a direction perpendicular or inclined to the axis of rotation
7/08 • with friction surfaces rectilinearly movable along each other (F16F 7/01 takes precedence) **[6]**
7/09 • • in dampers of the cylinder-and-piston type **[6]**
7/10 • using inertia effect
7/104 • • the inertia member being resiliently mounted **[6]**
7/108 • • • on plastics springs **[6]**
7/112 • • • on fluid springs **[6]**
7/116 • • • on metal springs **[6]**
7/12 • using plastic deformation of members
7/14 • of cable-support type, i.e. frictionally-engaged loop-forming cables

9/00 **Springs, vibration-dampers, shock-absorbers, or similarly-constructed movement-dampers using a fluid or the equivalent as damping medium** (F16F 5/00 takes precedence; connection of valves to inflatable elastic bodies B60C 29/00; door-operating appliances with fluid braking systems E05F)
9/02 • using gas only
9/04 • • in a chamber with a flexible wall
9/05 • • • the flexible wall being of the rolling diaphragm type **[5]**
9/06 • using both gas and liquid
9/08 • • in a chamber with a flexible wall

9/084 • • • comprising a gas spring contained within a flexible wall, the wall not being in contact with the damping fluid, i.e. mounted externally on the damper cylinder **[6]**

9/088 • • • comprising a gas spring with a flexible wall provided within the cylinder on the piston rod of a monotubular damper or within the inner tube of a bitubular damper **[6]**

9/092 • • • comprising a gas spring with a flexible wall provided between the tubes of a bitubular damper **[6]**

9/096 • • • comprising a hydropneumatic accumulator of the membrane type provided on the upper or the lower end of a damper or separately from or laterally on the damper **[6]**

9/10 • using liquid only; using a fluid of which the nature is immaterial

9/12 • • Devices with one or more rotary vanes turning in the fluid, any throttling effect being immaterial

9/14 • • Devices with one or more members, e.g. pistons, vanes, moving to and fro in chambers and using throttling effect

9/16 • • • involving only straight-line movement of the effective parts

9/18 • • • • with a closed cylinder and a piston separating two or more working spaces therein

9/19 • • • • • with a single cylinder

9/20 • • • • • with the piston-rod extending through both ends of the cylinder

9/22 • • • • with one or more cylinders, each having a single working space closed by a piston or plunger

9/24 • • • • • with a single cylinder and a single piston or plunger

9/26 • • • • • with two cylinders in line and with the two pistons or plungers connected together

9/28 • • • • • with two parallel cylinders and with the two pistons or plungers connected together

9/30 • with solid or semi-solid material, e.g. pasty masses, as damping medium

9/32 • Details

9/34 • • Special valve constructions (valves in general F16K); Shape or construction of throttling passages

9/342 • • • Throttling passages operating with metering pins

9/344 • • • Vortex flow passages **[6]**

9/346 • • • Throttling passages in the form of slots arranged in cylinder walls

9/348 • • • Throttling passages in the form of annular discs operating in opposite directions

9/36 • • Special sealings, including sealings or guides for piston-rods

9/38 • • Covers for protection or appearance

9/40 • • Arrangements for preventing froth

9/42 • • Cooling arrangements

9/43 • • Filling arrangements, e.g. for supply of gas

9/44 • • Means on or in the damper for manual or non-automatic adjustment; such means combined with temperature correction (F16F 9/53, F16F 9/56 take precedence; temperature correction only F16F 9/52) **[5, 6]**

9/46 • • • allowing control from a distance

9/48 • • Arrangements for providing different damping effects at different parts of the stroke (F16F 9/53, F16F 9/56 take precedence) **[5, 6]**

9/49 • • • Stops limiting fluid passage, e.g. hydraulic stops

9/50 • • Special means providing automatic damping adjustment (F16F 9/53, F16F 9/56 take precedence) **[5, 6]**

9/504 • • • Inertia-sensitive means **[6]**

9/508 • • • Means responsive to the velocity of movement of the piston **[6]**

9/512 • • • Means responsive to load action on the damper or fluid pressure in the damper **[6]**

9/516 • • • resulting in the damping effects during contraction being different from the damping effects during extension **[6]**

9/52 • • • in case of change of temperature (combined with external adjustment F16F 9/44)

9/53 • • Means for adjusting damping characteristics by varying fluid viscosity, e.g. electromagnetically **[5]**

9/54 • • Arrangements for attachment

9/56 • • Means for adjusting the length of, or for locking, the spring or damper, e.g. at the end of the stroke **[6]**

9/58 • • Stroke limiting stops, e.g. arranged on the piston rod outside the cylinder (F16F 9/49 takes precedence) **[6]**

11/00 Vibration-dampers or shock-absorbers working with both friction and a damping fluid

13/00 Units comprising springs of the non-fluid type as well as vibration-dampers, shock-absorbers, or fluid springs (F16F 5/00 takes precedence)

13/02 • damping by frictional contact between the spring and braking means (frictionally coacting wound springs F16F 3/06)

13/04 • comprising both a plastics spring and a damper, e.g. a friction damper **[6]**

13/06 • • the damper being a fluid damper, e.g. the plastics spring not forming a part of the wall of the fluid chamber of the damper (F16F 13/26 takes precedence) **[6]**

13/08 • • • the plastics spring forming at least a part of the wall of the fluid chamber of the damper (F16F 13/20-F16F 13/24 take precedence) **[6]**

13/10 • • • • the wall being at least in part formed by a flexible membrane or the like (F16F 13/12-F16F 13/18 take precedence) **[6]**

13/12 • • • • Single chamber dampers (F16F 13/14 takes precedence) **[6]**

13/14 • • • • Units of the bushing type **[6]**

13/16 • • • • • specially adapted for receiving axial loads **[6]**

13/18 • • • • characterised by the location or the shape of the equilibration chamber, e.g. the equilibration chamber surrounding the plastics spring or being annular (F16F 13/14 takes precedence) **[6]**

13/20 • • • characterised by comprising also a pneumatic spring (F16F 13/22 takes precedence) **[6]**

13/22 • • • characterised by comprising also a dynamic damper (dampers using inertia effect per se F16F 7/10) **[6]**

13/24 • • • the central part of the unit being supported by one element and both extremities of the unit being supported by a single other element, i.e. double acting mounting **[6]**

13/26 • • characterised by adjusting or regulating devices responsive to exterior conditions **[6]**

13/28 • • • specially adapted for units of the bushing type (F16F 13/30 takes precedence) **[6]**

13/30 • • • comprising means for varying fluid viscosity, e.g. of magnetic or electrorheological fluids **[6]**

15/00 **Suppression of vibrations in systems** (vehicle seat suspension devices B60N 2/50)**; Means or arrangements for avoiding or reducing out-of-balance forces, e.g. due to motion** (testing static or dynamic balance of machines or structures G01M 1/00)

15/02 • Suppression of vibrations of non-rotating, e.g. reciprocating, systems; Suppression of vibrations of rotating systems by use of members not moving with the rotating system (layered products B32B; suppression of vibration in ships B63)

15/023 • • using fluid means **[6]**

15/027 • • • comprising control arrangements **[6]**

15/03 • • using electromagnetic means (F16F 9/53 takes precedence) **[5]**

15/04 • • using elastic means (single elements or their attachment F16F 1/00-F16F 13/00) **[2]**

15/06 • • • with metal springs (with rubber springs also F16F 15/08)

15/067 • • • • using only wound springs **[6]**

15/073 • • • • using only leaf springs **[6]**

15/08 • • • with rubber springs

15/10 • Suppression of vibrations in rotating systems by making use of members moving with the system (by balancing F16F 15/22; with flywheels acting variably or intermittently F16H)

15/12 • • using elastic members or friction-damping members, e.g. between a rotating shaft and a gyratory mass mounted thereon (F16F 15/16 takes precedence) **[6]**

15/121 • • • using springs as elastic members, e.g. metallic springs (F16F 15/131 takes precedence) **[6]**

15/123 • • • • Wound springs **[6]**

15/124 • • • • Plastics springs, e.g. made of rubber (F16F 15/123 takes precedence) **[6]**

15/126 • • • • • consisting of at least one annular element surrounding the axis of rotation **[6]**

15/127 • • • • using plastics springs combined with other types of springs **[6]**

15/129 • • • characterised by friction-damping means (F16F 15/131 takes precedence) **[6]**

15/131 • • • the rotating system comprising two or more gyratory masses **[6]**

15/133 • • • • using springs as elastic members, e.g. metallic springs **[6]**

15/134 • • • • • Wound springs **[6]**

15/136 • • • • • Plastics springs, e.g. made of rubber (F16F 15/134 takes precedence) **[6]**

15/137 • • • • • the elastic members consisting of two or more springs of different types **[6]**

15/139 • • • • characterised by friction-damping means **[6]**

15/14 • • using freely-swinging masses rotating with the system

15/16 • • using a fluid (devices connecting input and output members F16D)

15/167 • • • having an inertia member, e.g. ring **[6]**

15/173 • • • • provided within a closed housing **[6]**

15/18 • • using electric means (dynamo-electric devices H02K)

15/20 • Suppression of vibrations of rotating systems by favourable grouping or relative arrangement of the moving members of the system or systems

15/22 • Compensation of inertia forces

15/24 • • of crankshaft systems by particular disposition of cranks, pistons, or the like

15/26 • • of crankshaft systems using solid masses, other than the ordinary pistons, moving with the system

15/28 • Counterweights; Attaching or mounting same (for roll-type closures E06B 9/62)

15/30 • Flywheels (F16F 15/16 takes precedence; suppression of vibrations in rotating systems using elastic members or friction-damping members moving with the system F16F 15/12; rotary-body aspects in general F16C 13/00, F16C 15/00) **[6]**

15/305 • • made of plastics, e.g. fibre reinforced plastics (FRP) **[6]**

15/31 • • characterised by means for varying the moment of inertia **[6]**

15/315 • • characterised by their supporting arrangement, e.g. mountings, cages, securing inertia member to shaft (F16F 15/31 takes precedence) **[6]**

15/32 • Correcting- or balancing-weights or equivalent means for balancing rotating bodies, e.g. vehicle wheels **[2, 5]**

15/34 • • Fastening arrangements therefor **[5]**

15/36 • • operating automatically **[5]**

F16G BELTS, CABLES, OR ROPES, PREDOMINANTLY USED FOR DRIVING PURPOSES; CHAINS; FITTINGS PREDOMINANTLY USED THEREFOR

Subclass index

1/00 **Driving-belts** (V-belts F16G 5/00; conveyer belts B65G)

1/02 • made of leather (F16G 1/28 takes precedence; making thereof C14B 9/00)

1/04 • made of fibrous material, e.g. textiles, whether rubber-covered or not (F16G 1/28 takes precedence; making thereof D03D)

1/06 • made of rubber (F16G 1/28 takes precedence; producing belts from plastics or substances in a plastic state B29D 29/00)
1/08 • • with reinforcement bonded by the rubber
1/10 • • • with textile reinforcement
1/12 • • • with metal reinforcement
1/14 • made of plastics (F16G 1/28 takes precedence; producing belts from plastics or substances in a plastic state B29D 29/00)
1/16 • • with reinforcement bonded by the plastic material
1/18 • made of wire (making thereof B21F 43/00)
1/20 • made of a single metal strip (making thereof B21D 53/14)
1/21 • built-up from superimposed layers, e.g. zig-zag folded
1/22 • consisting of several parts
1/24 • • in the form of links (in the shape of chain links F16G 13/08)
1/26 • • in the form of strips or lamellae
1/28 • with a contact surface of special shape, e.g. toothed

3/00 Belt fastenings, e.g. for conveyer belts (for V-belts F16G 7/00)
3/02 • with series of eyes or the like, interposed and linked by a pin to form a hinge (F16G 3/09 takes precedence)
3/04 • • in which the ends of separate U-shaped or like eyes are attached to the belt by parts penetrating into it
3/06 • with outwardly-bent, mutually-connected belt ends
3/07 • Friction clamps, e.g. of grommet-thimble type
3/08 • consisting of plates and screw-bolts or rivets (F16G 3/06 takes precedence)
3/09 • • the plates forming a hinge
3/10 • Joining belts by sewing, sticking, vulcanising, or the like; Constructional adaptations of the belt ends for this purpose
3/12 • Joining belts by lacing
3/14 • with extensible parts; with resilient parts
3/16 • Devices or machines for connecting driving-belts or the like

5/00 V-belts, i.e. belts of tapered cross-section
5/02 • made of leather (F16G 5/20 takes precedence)
5/04 • made of rubber (F16G 5/20 takes precedence)
5/06 • • with reinforcement bonded by the rubber
5/08 • • • with textile reinforcement
5/10 • • • with metal reinforcement
5/12 • made of plastics (F16G 5/20 takes precedence)
5/14 • • with reinforcement bonded by the plastic material
5/16 • consisting of several parts
5/18 • • in the form of links
5/20 • with a contact surface of special shape, e.g. toothed
5/22 • built-up from superimposed layers
5/24 • • zig-zag folded

7/00 V-belt fastenings
7/02 • locked, e.g. riveted
7/04 • quickly detachable
7/06 • adjustable, e.g. for tension

9/00 Ropes or cables specially adapted for driving, or for being driven by, pulleys or other gearing elements
9/02 • made of leather; having enveloping sheathings made of leather
9/04 • made of rubber or plastics (F16G 9/02 takes precedence)

11/00 Means for fastening cables or ropes to one another or to other objects (cable clamps for suspension bridge cables E01D 19/16)**; Caps or sleeves for fixing on cables or ropes** (attaching ropes or cables to lift cars or cages B66B 7/08, to winch drums or barrels B66D 1/34; rope clamps in earth drilling E21B 19/12)
11/02 • with parts deformable to grip the cable or cables; Fastening means which engage a sleeve or the like fixed on the cable
11/03 • incorporating resiliently-mounted members for attachment of the cable end
11/04 • with wedging action, e.g. friction clamps of grommet-thimble type (F16G 11/02 takes precedence)
11/05 • • by using conical plugs insertable between the strands
11/06 • with laterally-arranged screws (F16G 11/02, F16G 11/04 take precedence)
11/08 • Fastenings for securing ends of driving-cables to one another, the fastenings having approximately the same diameter as the cables
11/09 • • incorporating hinge joints or pivots for the attachment of the cable ends
11/10 • Quick-acting fastenings; Clamps holding in one direction only
11/12 • Connections or attachments, e.g. turnbuckles, adapted for straining of cables, ropes or wire
11/14 • Devices or coupling-pieces designed for easy formation of adjustable loops, e.g. choker hooks; Hooks or eyes with integral parts designed to facilitate quick attachment to cables or ropes at any point, e.g. by forming loops

13/00 Chains (making thereof B21L)
13/02 • Driving-chains
13/04 • • Toothed chains
13/06 • • with links connected by parallel driving-pins with or without rollers
13/07 • • • the links being of identical shape, e.g. cranked
13/08 • • with links closely interposed on the joint pins (F16G 13/04 takes precedence)
13/10 • • with universal joints
13/12 • Hauling- or hoisting-chains
13/14 • • built up from readily-separable links **[3]**
13/16 • • with arrangements for holding electric cables, hoses, or the like
13/18 • Chains having special overall characteristics
13/20 • • stiff; Push-pull chains
13/22 • • extensible
13/24 • • • resilient

15/00 Chain couplings; Shackles; Chain joints; Chain links; Chain bushes (making chain elements B21L)
15/02 • for fastening more or less permanently
15/04 • Quickly-detachable chain couplings; Shackles
15/06 • • Shackles designed for attachment by joint pins to chain elements, e.g. D-shackles
15/08 • Swivels
15/10 • Emergency joints or links
15/12 • Chain links
15/14 • • made of sheet metal, e.g. profiled

17/00 Hooks as integral parts of chains (hooks for cranes B66C 1/34)

F16H GEARING

Note(s)

1. Combinations including mechanical gearings are classified in groups F16H 37/00or F16H 47/00, unless they are provided for in groups F16H 1/00-F16H 35/00.
2. In this subclass, sets of rigidly-connected members are regarded as single members.
3. In this subclass, the following terms or expressions are used with the meanings indicated:
   - "toothed gearing" includes worm gearing and other gearing involving at least one wheel or sector provided with teeth or the equivalent, except gearing with chains or toothed belts, which is treated as friction gearing;
   - "conveying motion" includes transmitting energy, and means that the applied and resultant motions are of the same kind, though they may differ in, e.g. speed, direction or extent;
   - "rotary" implies that the motion may continue indefinitely.
   - "oscillating" means moving about an axis to an extent which is limited by the construction of the gearing and which may exceed one revolution, the movement being alternately forwards and backwards during continued operation of the gearing;
   - "reciprocating" means moving substantially in a straight line, the movement being alternately forwards and backwards during continued operation of the gearing;
   - "reversing" or "reversal" means that an applied movement in one direction may produce a resultant movement in either of two opposed directions at will;
   - "central gears" includes any gears whose axis is the main axis of the gearing.
4. Attention is drawn to the following places:

A01D 69/06	Gearings in harvesters or mowers
A63H 31/00	Gearing for toys
B21B 35/12	Toothed-wheel gearing for metal-rolling mills
B60K	Arrangement of transmissions in vehicles
B61C 9/00	Transmissions for railway locomotives
B62D 3/00	Vehicle steering gears
B62M	Transmissions for cycles
B63H 23/00	Transmissions for marine propulsion
B63H 25/00	Marine steering gears
F01-F04	Machines, engines, pumps
F15B 15/00	Gearings associated with fluid-actuated devices
G01D 5/04	Gearing used in indicating or recording apparatus in connection with measuring devices
H03J 1/00	Driving arrangements for tuning resonant circuits
H04L 13/04	Driving mechanisms for apparatus for transmission of coded digital information.

Subclass index

Toothed gearings for conveying rotary motion

1/00 Toothed gearings for conveying rotary motion (specific for conveying rotary motion with variable gear ratio or for reversing rotary motion F16H 3/00)

1/02 • without gears having orbital motion

1/04 • • involving only two intermeshing members

1/06 • • • with parallel axes

1/08 • • • • the members having helical, herring-bone, or like teeth

1/10 • • • • one of the members being internally toothed

1/12 • • • with non-parallel axes

1/14 • • • • comprising conical gears only

1/16 • • • • comprising worm and worm-wheel

1/18 • • • • the members having helical, herring-bone, or like teeth (F16H 1/14 takes precedence)

1/20 • • involving more than two intermeshing members
1/22 • • • with a plurality of driving or driven shafts; with arrangements for dividing torque between two or more intermediate shafts
1/24 • • involving gears essentially having intermeshing elements other than involute or cycloidal teeth (F16H 1/16 takes precedence)
1/26 • • Special means compensating for misalignment of axes
1/28 • with gears having orbital motion
1/30 • • in which an orbital gear has an axis crossing the main axis of the gearing and has helical teeth or is a worm
1/32 • • in which the central axis of the gearing lies inside the periphery of an orbital gear
1/34 • • involving gears essentially having intermeshing elements other than involute or cycloidal teeth (in worm gearing F16H 1/30)
1/36 • • with two central gears coupled by intermeshing orbital gears
1/46 • • Systems consisting of a plurality of gear trains, each with orbital gears
1/48 • • Special means compensating for misalignment of axes

3/00 Toothed gearings for conveying rotary motion with variable gear ratio or for reversing rotary motion (speed-changing or reversing mechanisms F16H 59/00-F16H 63/00)

3/02 • without gears having orbital motion
3/04 • • with internally-toothed gears
3/06 • • with worm and worm-wheel or gears essentially having helical or herring-bone teeth
3/08 • • exclusively or essentially with continuously-meshing gears, that can be disengaged from their shafts

Note(s) [2006.01]

In this group, gears which can be put out of mesh are not taken into consideration if they are used for reversal only.

3/083 • • • with radially acting and axially controlled clutching members, e.g. sliding keys **[5]**
3/085 • • • with more than one output shaft **[5]**
3/087 • • • characterised by the disposition of the gears (F16H 3/083, F16H 3/085 take precedence) **[5]**

Note(s)

When counting the countershafts, the reverse countershaft is not taken into consideration if it is used for reversal only.

3/089 • • • • all of the meshing gears being supported by a pair of parallel shafts, one being the input shaft and the other the output shaft, there being no countershaft involved **[5]**
3/091 • • • • including a single countershaft **[5]**
3/093 • • • • with two or more countershafts **[5]**
3/095 • • • • • with means for ensuring an even distribution of torque between the countershafts **[5]**
3/097 • • • • • the input and output shafts being aligned on the same axis **[5]**
3/10 • • • with one or more one-way clutches as an essential feature
3/12 • • • with means for synchronisation not incorporated in the clutches (synchronised clutches F16D 23/02)
3/14 • • • Gearings for reversal only
3/16 • • essentially with both gears that can be put out of gear and continuously-meshing gears that can be disengaged from their shafts

Note(s) [2006.01]

In this group, gears which can be put out of mesh are not taken into consideration if they are used for reversal only.

3/18 • • • Gearings for reversal only
3/20 • • exclusively or essentially using gears that can be moved out of gear

Note(s) [2006.01]

In this group, gears which can be put out of mesh are not taken into consideration if they are used for reversal only.

3/22 • • • with gears shiftable only axially
3/24 • • • • with driving and driven shafts coaxial
3/26 • • • • • • and two or more additional shafts
3/28 • • • • • • • an additional shaft being coaxial with the main shafts
3/30 • • • • with driving and driven shafts not coaxial
3/32 • • • • • • and an additional shaft
3/34 • • • with gears shiftable otherwise than only axially
3/36 • • • with a single gear meshable with any of a set of coaxial gears of different diameters
3/38 • • • with synchro-meshing
3/40 • • • Gearings for reversal only
3/42 • • with gears having teeth formed or arranged for obtaining multiple gear ratios, e.g. nearly infinitely variable
3/44 • using gears having orbital motion
3/46 • • Gearings having only two central gears, connected by orbital gears (F16H 3/68-F16H 3/78 take precedence)
3/48 • • • with single orbital gears or pairs of rigidly-connected orbital gears
3/50 • • • • comprising orbital conical gears
3/52 • • • • comprising orbital spur gears
3/54 • • • • • • one of the central gears being internally toothed and the other externally toothed
3/56 • • • • • • both central gears being sun gears
3/58 • • • with sets of orbital gears, each consisting of two or more intermeshing orbital gears
3/60 • • • Gearings for reversal only
3/62 • • Gearings having three or more central gears (F16H 3/68-F16H 3/78 take precedence)
3/64 • • • composed of a number of gear trains, the drive always passing through all the trains, each train having not more than one connection for driving another train
3/66 • • • composed of a number of gear trains without drive passing from one train to another
3/68 • • in which an orbital gear has an axis crossing the main axis of the gearing and has helical teeth or is a worm
3/70 • • in which the central axis of the gearing lies inside the periphery of an orbital gear
3/72 • • with a secondary drive, e.g. regulating motor, in order to vary speed continuously
3/74 • • Complexes, not using actuatable speed-changing or regulating members, e.g. with gear ratio determined by free play of frictional or other forces
3/76 • • with an orbital gear having teeth formed or arranged for obtaining multiple gear ratios, e.g. nearly infinitely variable

3/78 • • Special adaptation of synchronisation mechanisms to these gearings

Gearing for conveying rotary motion by endless flexible members

7/00 Gearings for conveying rotary motion by endless flexible members (specific for conveying rotary motion with variable gear ratio or for reversing rotary motion F16H 9/00; endless flexible members per se, e.g. belts or chains F16G)

7/02 • with belts; with V-belts
7/04 • with ropes
7/06 • with chains
7/08 • Means for varying tension of belts, ropes, or chains (pulleys of adjustable construction F16H 55/52)
7/10 • • by adjusting the axis of a pulley
7/12 • • • of an idle pulley
7/14 • • • of a driving or driven pulley
7/16 • • • • without adjusting the driving or driven shaft
7/18 • Means for guiding or supporting belts, ropes, or chains (construction of pulleys F16H 55/36)
7/20 • • Mountings for rollers or pulleys
7/22 • Belt, rope, or chain shifters
7/24 • Equipment for mounting belts, ropes, or chains

9/00 Gearings for conveying rotary motion with variable gear ratio, or for reversing rotary motion, by endless flexible members (control of change-speed or reversing-gearings conveying rotary motion F16H 59/00-F16H 63/00; endless flexible members per se, e.g. belts or chains F16G)

9/02 • without members having orbital motion
9/04 • • using belts, V-belts, or ropes (with toothed belts F16H 9/24; pulleys of adjustable construction F16H 55/52)
9/06 • • • engaging a stepped pulley
9/08 • • • engaging a conical drum (F16H 9/12 takes precedence)
9/10 • • • engaging a pulley provided with radially-actuatable elements carrying the belt
9/12 • • • engaging a pulley built-up out of relatively axially-adjustable parts in which the belt engages the opposite flanges of the pulley directly without interposed belt-supporting members
9/14 • • • • using only one pulley built-up out of adjustable conical parts
9/16 • • • • using two pulleys, both built-up out of adjustable conical parts
9/18 • • • • • only one flange of each pulley being adjustable
9/20 • • • • • both flanges of the pulleys being adjustable
9/22 • • • specially adapted for ropes
9/24 • • using chains, toothed belts, belts in the form of links; Chains or belts specially adapted to such gearing (toothed belts F16G 1/28; V-belts in the form of links F16G 5/18; toothed V-belts F16G 5/20)
9/26 • with members having orbital motion

Other friction gearing for conveying rotary motion

13/00 Gearing for conveying rotary motion with constant gear ratio by friction between rotary members (specific for conveying rotary motion with variable gear ratio or for reversing rotary motion F16H 15/00)

13/02 • without members having orbital motion
13/04 • • with balls or with rollers acting in a similar manner
13/06 • with members having orbital motion
13/08 • • with balls or with rollers acting in a similar manner
13/10 • Means for influencing the pressure between the members
13/12 • • by magnetic forces
13/14 • • for automatically varying the pressure mechanically

15/00 Gearings for conveying rotary motion with variable gear ratio, or for reversing rotary motion, by friction between rotary members (control of change-speed or reversing-gearings conveying rotary motion F16H 59/00-F16H 63/00)

15/01 • characterised by the use of a magnetisable powder or liquid as friction medium between the rotary members **[2]**
15/02 • without members having orbital motion
15/04 • • Gearings providing a continuous range of gear ratios
15/06 • • • in which a member A of uniform effective diameter mounted on a shaft may co-operate with different parts of a member B
15/08 • • • • in which the member B is a disc with a flat or approximately-flat friction surface
15/10 • • • • • in which the axes of the two members cross or intersect
15/12 • • • • • • in which one or each member is duplicated, e.g. for obtaining better transmission, for lessening the reaction forces on the bearings
15/14 • • • • • in which the axes of the members are parallel or approximately parallel
15/16 • • • • in which the member B has a conical friction surface
15/18 • • • • • externally
15/20 • • • • • • co-operating with the outer rim of the member A, which is perpendicular or nearly perpendicular to the friction surface of the member B
15/22 • • • • • • the axes of the members being parallel or approximately parallel
15/24 • • • • • internally
15/26 • • • • in which the member B has a spherical friction surface centered on its axis of revolution
15/28 • • • • • with external friction surface
15/30 • • • • • with internal friction surface
15/32 • • • • in which the member B has a curved friction surface formed as a surface of a body of revolution generated by a curve which is neither a circular arc centered on its axis of revolution nor a straight line
15/34 • • • • • with convex friction surface
15/36 • • • • • with concave friction surface, e.g. a hollow toroid surface

15/38 • • • • • • with two members B having hollow toroid surfaces opposite to each other, the member or members A being adjustably mounted between the surfaces
15/40 • • • in which two members co-operate by means of balls, or rollers of uniform effective diameter, not mounted on shafts
15/42 • • • in which two members co-operate by means of rings or by means of parts of endless flexible members pressed between the first-mentioned members
15/44 • • • in which two members of non-uniform effective diameter directly co-operate with one another
15/46 • • Gearings providing a discontinuous or stepped range of gear ratios
15/48 • with members having orbital motion
15/50 • • Gearings providing a continuous range of gear ratios
15/52 • • • in which a member of uniform effective diameter mounted on a shaft may co-operate with different parts of another member
15/54 • • • in which two members co-operate by means of rings or by means of parts of endless flexible members pressed between the first-mentioned members
15/56 • • Gearings providing a discontinuous or stepped range of gear ratios

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19/00 Gearings comprising essentially only toothed gears or friction members and not capable of conveying indefinitely-continuing rotary motion (with intermittently-driving members F16H 27/00-F16H 31/00; rope or like tackle for lifting or haulage B66D 3/00)
19/02 • for interconverting rotary motion and reciprocating motion
19/04 • • comprising a rack
19/06 • • comprising an endless flexible member
19/08 • for interconverting rotary motion and oscillating motion

<u>Gearing for conveying or converting motion by means of levers, links,cams or screw-and-nut mechanisms</u>

21/00 Gearings comprising primarily only links or levers, with or without slides (F16H 23/00 takes precedence)
21/02 • the movements of two or more independently-moving members being combined into a single movement
21/04 • Guiding mechanisms, e.g. for straight-line guidance (for drawing-machines B43L)
21/06 • which can be made ineffective when desired
21/08 • • by pushing a reciprocating rod out of its operative position
21/10 • all movement being in, or parallel to, a single plane
21/12 • • for conveying rotary motion
21/14 • • • by means of cranks, eccentrics, or like members fixed to one rotary member and guided along tracks on the other
21/16 • • for interconverting rotary motion and reciprocating motion
21/18 • • • Crank gearings; Eccentric gearings
21/20 • • • • with adjustment of throw (adjustable cranks or eccentrics F16C 3/28; adjustable connecting-rods F16C 7/06)
21/22 • • • • with one connecting-rod and one guided slide to each crank or eccentric
21/24 • • • • • without further links or guides
21/26 • • • • • with toggle action
21/28 • • • • • with cams or additional guides
21/30 • • • • • with members having rolling contact
21/32 • • • • • with additional members comprising only pivoted links or arms
21/34 • • • • with two or more connecting-rods to each crank or eccentric
21/36 • • • • without swinging connecting-rod, e.g. with epicyclic parallel motion, slot-and- crank motion
21/38 • • • • with means for temporary energy accumulation, e.g. to overcome dead-centre positions
21/40 • • for interconverting rotary motion and oscillating motion
21/42 • • • with adjustable throw
21/44 • • for conveying or interconverting oscillating or reciprocating motions
21/46 • with movements in three dimensions
21/48 • • for conveying rotary motion
21/50 • • for interconverting rotary motion and reciprocating motion
21/52 • • for interconverting rotary motion and oscillating motion
21/54 • • for conveying or interconverting oscillating or reciprocating motions

23/00 Wobble-plate gearings; Oblique-crank gearings
23/02 • with adjustment of throw by changing the position of the wobble-member (F16H 29/04, F16H 33/10 take precedence)
23/04 • with non-rotary wobble-members
23/06 • • with sliding members hinged to reciprocating members
23/08 • • connected to reciprocating members by connecting-rods
23/10 • with rotary wobble-plates with plane surfaces

25/00 Gearings comprising primarily only cams, cam-followers and screw-and-nut mechanisms
25/02 • the movements of two or more independently-moving members being combined into a single movement
25/04 • for conveying rotary motion
25/06 • • with intermediate members guided along tracks on both rotary members
25/08 • for interconverting rotary motion and reciprocating motion (F16H 23/00 takes precedence)
25/10 • • with adjustable throw (adjustable cams F16H 53/04)
25/12 • • with reciprocation along the axis of rotation, e.g. gearings with helical grooves and automatic reversal (screw mechanisms without automatic reversal F16H 25/20)
25/14 • • with reciprocation perpendicular to the axis of rotation (F16H 21/36 takes precedence)
25/16 • for interconverting rotary motion and oscillating motion
25/18 • for conveying or interconverting oscillating or reciprocating motions

25/20 • • Screw mechanisms (with automatic reversal F16H 25/12)

25/22 • • • with balls, rollers, or similar members between the co-operating parts; Elements essential to the use of such members

25/24 • • • Elements essential to such mechanisms, e.g. screws, nuts (F16H 25/22 takes precedence)

Gearings with intermittently-driving members

27/00 Step-by-step mechanisms without freewheel members, e.g. Geneva drives (rotary gearings with cyclically-varying velocity ratio F16H 35/02; impulse couplings F16D 5/00; clockwork escapements G04B 15/00)

27/02 • with at least one reciprocating or oscillating transmission member

27/04 • for converting continuous rotation into a step-by-step rotary movement

27/06 • • Mechanisms with driving pins in driven slots, e.g. Geneva drives

27/08 • • with driving toothed gears with interrupted toothing

27/10 • • obtained by means of disengageable transmission members, combined or not combined with mechanisms according to group F16H 27/06 or F16H 27/08

29/00 Gearings for conveying rotary motion with intermittently-driving members, e.g. with freewheel action (freewheels F16D 41/00)

29/02 • between one of the shafts and an oscillating or reciprocating intermediate member, not rotating with either of the shafts (F16H 29/20, F16H 29/22 take precedence)

29/04 • • in which the transmission ratio is changed by adjustment of a crank, an eccentric, a wobble-plate, or a cam, on one of the shafts

29/06 • • • with concentric shafts, an annular intermediate member moving around and being supported on an adjustable crank or eccentric

29/08 • • in which the transmission ratio is changed by adjustment of the path of movement, the location of the pivot, or the effective length, of an oscillating connecting member

29/10 • • in which the transmission ratio is changed by directly acting on the intermittently driving members

29/12 • between rotary driving and driven members (F16H 29/20, F16H 29/22 take precedence)

29/14 • • in which the transmission ratio is changed by adjustment of an otherwise stationary guide member for the intermittently-driving members

29/16 • • in which the transmission ratio is changed by adjustment of the distance between the axes of the rotary members

29/18 • • • in which the intermittently-driving members slide along approximately radial guides while rotating with one of the rotary members

29/20 • the intermittently-acting members being shaped as worms, screws, or racks

29/22 • with automatic speed change

31/00 Other gearings with freewheeling members or other intermittently-driving members (F16H 21/00, F16H 23/00, F16H 25/00 take precedence; gearings involving the use of automatic changing-mechanisms, e.g. cyclically-actuated reversal gearings, see the appropriate groups)

33/00 Gearings based on repeated accumulation and delivery of energy

33/02 • Rotary transmissions with mechanical accumulators, e.g. weights, springs, intermittently-connected flywheels

33/04 • • Gearings for conveying rotary motion with variable velocity ratio, in which self-regulation is sought

33/06 • • • based essentially on spring action (ratchet slip couplings F16D 7/04)

33/08 • • • based essentially on inertia

33/10 • • • • with gyroscopic action, e.g. comprising wobble-plates, oblique cranks

33/12 • • • • with a driving member connected differentially with both a driven member and an oscillatory member with large resistance to movement, e.g. Constantinesco gearing

33/14 • • • • having orbital members influenced by regulating masses

33/16 • • • • • which have their own free motion, or consist of fluid

33/18 • • • • • of which the motion is constrained

33/20 • for interconversion, based essentially on inertia, of rotary motion and reciprocating or oscillating motion

35/00 Gearings or mechanisms with other special functional features

35/02 • for conveying rotary motion with cyclically-varying velocity ratio (speed-changing mechanisms operating cyclically, see the appropriate groups)

35/06 • Gearings designed to allow relative movement between supports thereof without ill effects (F16H 1/26, F16H 1/48 take precedence)

35/08 • for adjustment of members on moving parts from a stationary place

35/10 • Arrangements or devices for absorbing overload or preventing damage by overload (couplings for transmitting rotation F16D)

35/12 • Transmitting mechanisms with delayed effect (vibration- or shock-dampers in general F16F)

35/14 • Mechanisms with only two stable positions, e.g. acting at definite angular positions

35/16 • Mechanisms for movements or movement relations conforming to mathematical formulae (devices in which computing operations are performed mechanically G06G 3/00)

35/18 • Turning devices for rotatable members, e.g. shafts (starting devices for internal-combustion engines F02N)

37/00 Combinations of mechanical gearings, notprovided for in groups F16H 1/00-F16H 35/00 (combinations of mechanical gearing with fluid clutches or fluid gearing F16H 47/00; applications of underdrives or overdrives in motor vehicles, combinations with differential gearings in motor vehicles B60K)

37/02 • comprising essentially only toothed or friction gearings

37/04 • • Combinations of toothed gearings only (F16H 37/06 takes precedence)
37/06 • • with a plurality of driving or driven shafts; with arrangements for dividing torque between two or more intermediate shafts
37/08 • • • with differential gearing
37/10 • • • • at both ends of intermediate shafts
37/12 • Gearings comprising primarily toothed or friction gearing, links or levers, and cams, or members of at least two of these three types (F16H 21/14, F16H 21/28, F16H 21/30 take precedence; toothed or friction gearing or cam gearing, with only an additional lever or link, see the appropriate group for the main gearing)
37/14 • • the movements of two or more independently-moving members being combined into a single movement
37/16 • • with a driving or driven member which both rotates or oscillates on its axis and reciprocates

Fluid gearing [3]

39/00 Rotary fluid gearing using pumps and motors of the volumetric type, i.e. passing a predetermined volume of fluid per revolution (control of exclusively fluid gearing F16H 61/38; fluid couplings or clutches with pumping sets of volumetric type F16D 31/00; application to lifting or pushing equipment B66F) **[5]**
39/01 • Pneumatic gearing; Gearing working with subatmospheric pressure (pneumatic hammers B25D 9/00) **[2]**
39/02 • with liquid motors at a distance from liquid pumps
39/04 • with liquid motor and pump combined in one unit
39/06 • • pump and motor being of the same type
39/08 • • • each with one main shaft and provided with pistons reciprocating in cylinders
39/10 • • • • with cylinders arranged around, and parallel or approximately parallel to, the main axis of the gearing
39/12 • • • • • with stationary cylinders
39/14 • • • • • with cylinders carried in rotary cylinder blocks or cylinder-bearing members
39/16 • • • • with cylinders arranged perpendicular to the main axis of the gearing
39/18 • • • • • the connections of the pistons being at the outer ends of the cylinders
39/20 • • • • • the connections of the pistons being at the inner ends of the cylinders
39/22 • • • with liquid chambers shaped as bodies of revolution concentric with the main axis of the gearing
39/24 • • • • with rotary displacement members, e.g. provided with axially or radially movable vanes passing movable sealing members
39/26 • • • with liquid chambers not shaped as bodies of revolution or shaped as bodies of revolution eccentric to the main axis of the gearing
39/28 • • • • with liquid chambers formed in rotary members
39/30 • • • • with liquid chambers formed in stationary members
39/32 • • • • • with sliding vanes carried by the rotor
39/34 • • • in which a rotor on one shaft co-operates with a rotor on another shaft
39/36 • • • • toothed-gear type
39/38 • • • • Displacement screw-pump type
39/40 • • • Hydraulic differential gearings, e.g. having a rotary input housing with interconnected liquid chambers for both outputs
39/42 • • pump and motor being of different types

41/00 Rotary fluid gearing of the hydrokinetic type (control of exclusively fluid gearing F16H 61/38; rotary fluid couplings or clutches of the hydrokinetic type F16D 33/00) **[5]**
41/02 • with pump and turbine connected by conduits or ducts
41/04 • Combined pump-turbine units
41/22 • • Gearing systems consisting of a plurality of hydrokinetic units operating alternatively, e.g. made effective or ineffective by filling or emptying or by mechanical clutches
41/24 • Details
41/26 • • Shape of runner blades or channels with respect to function
41/28 • • with respect to manufacture, e.g. blade attachment
41/30 • • relating to venting, lubrication, cooling, circulation of the cooling medium
41/32 • Selection of working fluids (chemical aspects, see the relevant classes)

43/00 Other fluid gearing, e.g. with oscillating input or output [2]
43/02 • Fluid gearing actuated by pressure waves **[2]**

45/00 Combinations of fluid gearings for conveying rotary motion with couplings or clutches (F16H 41/22 takes precedence; conjoint control of driveline clutches and change-speed gearing in vehicles B60W 10/02, B60W 10/10) **[2]**

Note(s)

Clutches for varying working conditions in fluid torque-converters are regarded as a part of the latter.

45/02 • with mechanical clutches for bridging a fluid gearing of the hydrokinetic type (control of torque converter lock-up clutches F16H 61/14)

47/00 Combinations of mechanical gearing with fluid clutches or fluid gearing (conjoint control of driveline clutches and change-speed gearing in vehicles B60W 10/02, B60W 10/10) **[2]**
47/02 • the fluid gearing being of the volumetric type
47/04 • • the mechanical gearing being of the type with members having orbital motion
47/06 • the fluid gearing being of the hydrokinetic type
47/07 • • using two or more power-transmitting fluid circuits (F16H 47/10 takes precedence) **[2]**
47/08 • • the mechanical gearing being of the type with members having orbital motion
47/10 • • • using two or more power-transmitting fluid circuits **[2]**
47/12 • • • the members with orbital motion having vanes interacting with the fluid **[2]**

48/00 Differential gearings [6]

Note(s)

Documents relating to transfer gears are classified both in group F16H 48/02and in groups F16H 48/06-F16H 48/20.

48/02 • Transfer gears for influencing drive between outputs **[6]**

48/04 • • having unequal torque transfer between two outputs **[6]**

Note(s)

1. When classifying in groups F16H 48/06-F16H 48/20, classification is made in the last appropriate place.
2. When classifying in groups F16H 48/06-F16H 48/20, constructional features of differential gearings not identified by the classification according to Note (1), and which are considered to represent information of interest for search, may also be classified. Such non-obligatory classification should be given as "additional information".

48/06 • with gears having orbital motion **[6]**
48/08 • • with orbital conical gears **[6]**
48/10 • • with orbital spur gears **[6]**
48/12 • without gears having orbital motion **[6]**
48/14 • • with cams **[6]**
48/16 • • with freewheels **[6]**
48/18 • • with fluid gearing **[6]**
48/20 • Arrangements for suppressing or influencing the differential action, e.g. locking devices **[6]**
48/22 • • using friction clutches or brakes **[6]**
48/24 • • using positive clutches or brakes **[6]**
48/26 • • using fluid action, e.g. viscous clutches **[6]**
48/28 • • using self-locking gears **[6]**
48/30 • • using externally-actuatable locking devices **[6]**

49/00 Other gearing

Details of gearing or mechanisms

51/00 Levers of gearing mechanisms (shafts, Bowden mechanisms, cranks, eccentrics, bearings, pivotal connections, crossheads, connecting-rods F16C; manipulating levers G05G)
51/02 • adjustable

53/00 Cams or cam-followers, e.g. rollers for gearing mechanisms (shafts, Bowden mechanisms, cranks, eccentrics, bearings, pivotal connections, crossheads, connecting-rods F16C; cams specially adapted for reciprocating-piston liquid engines F03C 1/30)
53/02 • Single-track cams for single-revolution cycles; Camshafts with such cams
53/04 • • Adjustable cams
53/06 • Cam-followers (F16H 53/08 takes precedence)
53/08 • Multi-track cams, e.g. for cycles consisting of several revolutions; Cam-followers specially adapted for such cams

55/00 Elements with teeth or friction surfaces for conveying motion; Worms, pulleys orsheaves for gearing mechanisms (of screw-and-nut gearing F16H 25/00; shafts, Bowden mechanisms, cranks, eccentrics, bearings, pivotal connections, crossheads, connecting-rods F16C; chains, belts F16G; pulley-blocks for lifting or hauling appliances B66D 3/04) **[4]**
55/02 • Toothed members; Worms
55/06 • • Use of materials; Use of treatments of toothed members or worms to affect their intrinsic material properties **[3]**
55/08 • • Profiling **[3]**
55/10 • • Constructively simple tooth shapes, e.g. shaped as pins, as balls **[3]**
55/12 • • with body or rim assembled out of detachable parts **[3]**
55/14 • • Construction providing resilience or vibration-damping (F16H 55/06 takes precedence; resilient coupling of wheel or wheel-rim with shaft F16D 3/50, F16D 3/80) **[3]**
55/16 • • • relating to teeth only **[3]**
55/17 • • Toothed wheels (worm wheels F16H 55/22; chain wheels F16H 55/30) **[3]**
55/18 • • • Special devices for taking-up backlash
55/20 • • • • for bevel gears
55/22 • • for transmissions with crossing shafts, especially worms, worm-gears (bevel gears, crown wheels, helical gears F16H 55/17)
55/24 • • • Special devices for taking up backlash
55/26 • • Racks
55/28 • • • Special devices for taking up backlash
55/30 • • Chain wheels (specially adapted for cycles B62M)
55/32 • Friction members (friction surfaces F16D 69/00)
55/34 • • Non-adjustable friction discs
55/36 • • Pulleys (with features essential for adjustment F16H 55/52)
55/38 • • • Means or measures for increasing adhesion (in general F16D 69/00)
55/40 • • • with spokes (F16H 55/48 takes precedence)
55/42 • • • Laminated pulleys
55/44 • • • Sheet-metal pulleys
55/46 • • • Split pulleys
55/48 • • • manufactured exclusively or in part of non-metallic material, e.g. plastics (F16H 55/38, F16H 55/42, F16H 55/46 take precedence)
55/49 • • • Features essential to V-belt pulleys **[2]**
55/50 • • • Features essential to rope pulleys
55/52 • • Pulleys or friction discs of adjustable construction
55/54 • • • of which the bearing parts are radially adjustable
55/56 • • • of which the bearing parts are relatively axially adjustable

57/00 General details of gearing (of fluid gearing F16H 39/00-F16H 43/00; of screw-and-nut gearing F16H 25/00; shafts, Bowden mechanisms, cranks, eccentrics, bearings, pivotal connections, crossheads, connecting-rods F16C)
57/02 • Gear-boxes; Mounting gearing therein
57/04 • Features relating to lubrication or cooling (control of lubrication or cooling in hydrostatic gearing F16H 61/4165) **[1, 2010.01]**
57/05 • • of chains (for conveyers B65G 45/08)
57/08 • of gearings with members having orbital motion
57/10 • • Braking arrangements
57/12 • Arrangements for adjusting or for taking-up backlash not provided for elsewhere **[2]**

Control of gearing conveying rotary motion [5]

Note(s)

1. Attention is drawn to the Notes following the title of subclass B60W.
2. In groups F16H 59/00-F16H 63/00, clutches positioned within a gearbox are considered as comprising part of the gearings.
3. In groups F16H 59/00-F16H 63/00, the following terms or expressions are used with the meaning indicated:

- "final output element" means the final element which is moved to establish a gear ratio, i.e. which achieves the linking between two power transmission means, e.g. reverse idler gear, gear cluster, coupling sleeve, apply piston of a hydraulic clutch;
- "mechanism" means a kinematic chain consisting either of a single element or alternatively of a series of elements, the position of each point on the kinematic chain being derivable from the position of any other point on the chain, and therefore, for a given position of a point on one of the elements forming the kinematic chain there is only one position for each of the other points on the element or series of elements forming the kinematic chain;
- "final output mechanism" means the mechanism which includes the final output element;
- "actuating mechanism" means the mechanism, the movement of which causes the movement of another mechanism by being in mutual contact;
- "final actuating mechanism" means the mechanism actuating the final output mechanism.

4. Combinations of features individually covered by group F16H 61/00 and one or both of groups F16H 59/00 and F16H 63/00 are classified in group F16H 61/00.
5. Combinations of features individually covered by groups F16H 59/00 and F16H 63/00 are classified in group F16H 63/00.
6. When classifying in groups F16H 59/00-F16H 63/00, control inputs or types of gearing which are not identified by the classification according to Notes (4) and (5), and which are considered to represent information of interest for search, may also be classified. Such non-obligatory classification should be given as "additional information", e.g. selected from subgroup F16H 61/66 relating to the type of gearing controlled or from group F16H 59/00 relating to control inputs.

59/00 Control inputs to change-speed- or reversing-gearings for conveying rotary motion [5]

59/02 • Selector apparatus **[5]**
59/04 • • Ratio selector apparatus **[5]**
59/06 • • • the ratio being infinitely variable **[5]**
59/08 • • Range selector apparatus **[5]**
59/10 • • • comprising levers **[5]**
59/12 • • • comprising push button devices **[5]**
59/14 • Inputs being a function of torque or torque demand **[5]**
59/16 • • Dynamometric measurement of torque **[5]**
59/18 • • dependent on the position of the accelerator pedal **[5]**
59/20 • • • Kickdown **[5]**
59/22 • • • Idle position **[5]**
59/24 • • dependent on the throttle opening **[5]**
59/26 • • dependent on pressure **[5]**
59/28 • • • Gasifier pressure in gas turbines **[5]**
59/30 • • • Intake manifold vacuum **[5]**
59/32 • • • Supercharger pressure in internal combustion engines **[5]**
59/34 • • dependent on fuel feed **[5]**
59/36 • Inputs being a function of speed **[5]**
59/38 • • of gearing elements **[5]**
59/40 • • • Output shaft speed **[5]**
59/42 • • • Input shaft speed **[5]**
59/44 • • dependent on machine speed (F16H 59/46 takes precedence) **[5]**
59/46 • • dependent on a comparison between speeds **[5]**
59/48 • Inputs being a function of acceleration **[5]**
59/50 • Inputs being a function of the status of the machine, e.g. position of doors or safety belts **[5]**
59/52 • • dependent on the weight of the machine, e.g. change in weight resulting from passengers boarding a bus **[5]**
59/54 • • dependent on signals from the brakes, e.g. parking brakes **[5]**
59/56 • • dependent on signals from the main clutch **[5]**
59/58 • • dependent on signals from the steering **[5]**
59/60 • Inputs being a function of ambient conditions **[5]**
59/62 • • Atmospheric pressure **[5]**
59/64 • • Atmospheric temperature **[5]**
59/66 • • Road conditions, e.g. slope, slippery **[5]**
59/68 • Inputs being a function of gearing status **[5]**
59/70 • • dependent on the ratio established **[5]**
59/72 • • dependent on oil characteristics, e.g. temperature, viscosity **[5]**
59/74 • Inputs being a function of engine parameters (F16H 59/14 takes precedence) **[5]**
59/76 • • Number of cylinders operating **[5]**
59/78 • • Temperature **[5]**

61/00 Control functions within change-speed- or reversing-gearings for conveying rotary motion [5]

61/02 • characterised by the signals used **[5]**
61/04 • Smoothing ratio shift **[5]**
61/06 • • by controlling rate of change of fluid pressure **[5]**
61/08 • • Timing control **[5]**
61/10 • Regulating shift hysteresis **[5]**
61/12 • Detecting malfunction or potential malfunction, e.g. fail safe (in control of hydrostatic gearing F16H 61/4192) **[5, 2010.01]**
61/14 • Control of torque converter lock-up clutches **[5]**
61/16 • Inhibiting shift during unfavourable conditions (F16H 61/18 takes precedence) **[5]**
61/18 • Preventing unintentional or unsafe shift (constructional features of the final output mechanisms F16H 63/30) **[5]**
61/20 • Preventing gear creeping **[5]**
61/21 • Providing engine brake control **[7]**
61/22 • Locking (F16H 63/34 takes precedence) **[5]**
61/24 • Providing feel, e.g. to enable selection **[5]**
61/26 • Generation or transmission of movements for final actuating mechanisms **[5]**

Note(s)

1. The generation or transmission of movements comprising only the selector apparatus, is classified in group F16H 59/00.
2. The generation or transmission of movements, when part of the final output mechanisms, is classified in group F16H 63/00.

61/28 • • with at least one movement of the final actuating mechanism being caused by a non-mechanical force, e.g. power-assisted **[5]**
61/30 • • • Hydraulic motors therefor **[5]**
61/32 • • • Electric motors therefor **[5]**

61/34 • • comprising two mechanisms, one for the preselection movement, and one for the shifting movement (F16H 61/36 takes precedence) **[5]**
61/36 • • with at least one movement being transmitted by a cable **[5]**
61/38 • Control of exclusively fluid gearing **[5]**
61/40 • • hydrostatic (involving modification of the gearing F16H 39/02, F16H 39/04) **[5, 2010.01]**
61/4008 • • • Control of circuit pressure **[2010.01]**
61/4017 • • • • Control of high pressure, e.g. avoiding excess pressure by a relief valve **[2010.01]**
61/4026 • • • • Control of low pressure **[2010.01]**
61/4035 • • • Control of circuit flow **[2010.01]**
61/4043 • • • Control of a bypass valve **[2010.01]**
61/4052 • • • • by using a variable restriction, e.g. an orifice valve **[2010.01]**
61/4061 • • • Control related to directional control valves, e.g. change-over valves, for crossing the feeding conduits (forward reverse switching by using swash plate F16H 61/438) **[2010.01]**
61/4069 • • • Valves related to the control of neutral, e.g. shut off valves (zero tilt rotation holding means F16H 61/439) **[2010.01]**
61/4078 • • • Fluid exchange between hydrostatic circuits and external sources or consumers **[2010.01]**
61/4096 • • • • with pressure accumulators **[2010.01]**
61/4104 • • • • Flushing, e.g. by using flushing valves or by connection to exhaust **[2010.01]**
61/4131 • • • • Fluid exchange by aspiration from reservoirs, e.g. sump **[2010.01]**
61/4139 • • • • Replenishing or scavenging pumps, e.g. auxiliary charge pumps **[2010.01]**
61/4148 • • • Open loop circuits **[2010.01]**
61/4157 • • • Control of braking, e.g. preventing pump over-speeding when motor acts as a pump **[2010.01]**
61/4165 • • • Control of cooling or lubricating **[2010.01]**
61/4174 • • • Control of venting, e.g. removing trapped air **[2010.01]**
61/4183 • • • Preventing or reducing vibrations or noise, e.g. avoiding cavitations **[2010.01]**
61/4192 • • • Detecting malfunction or potential malfunction, e.g. fail safe **[2010.01]**
61/42 • • • involving adjustment of a pump or motor with adjustable output or capacity **[5, 2010.01]**
61/421 • • • • Motor capacity control by electro-hydraulic control means, e.g. using solenoid valves **[2010.01]**
61/423 • • • • Motor capacity control by fluid pressure control means **[2010.01]**
61/425 • • • • Motor capacity control by electric actuators **[2010.01]**
61/427 • • • • Motor capacity control by mechanical control means, e.g. by levers or pedals **[2010.01]**
61/431 • • • • Pump capacity control by electro-hydraulic control means, e.g. using solenoid valve **[2010.01]**
61/433 • • • • Pump capacity control by fluid pressure control means **[2010.01]**
61/435 • • • • Pump capacity control by electric actuators **[2010.01]**
61/437 • • • • Pump capacity control by mechanical control means, e.g. by levers or pedals **[2010.01]**
61/438 • • • • Control of forward-reverse switching, e.g. control of the swash plate causing discharge in two directions (using a directional control valve F16H 61/4061) **[2010.01]**
61/439 • • • • Control of the neutral position, e.g. by zero tilt rotation holding means (using a neutral valve or a shutoff valve F16H 61/4069) **[2010.01]**
61/44 • • • with more than one pump or motor unit in operation **[5]**
61/444 • • • • by changing the number of pump or motor units in operation **[2010.01]**
61/448 • • • • Control circuits for tandem pumps or motors **[2010.01]**
61/452 • • • • Selectively controlling multiple pumps or motors, e.g. switching between series or parallel **[2010.01]**
61/456 • • • • Control of the balance of torque or speed between pumps or motors (hydrostatic differentials F16H 48/18) **[2010.01]**
61/46 • • • Automatic regulation in accordance with output requirements **[5, 2010.01]**
61/462 • • • • for achieving a target speed ratio **[2010.01]**
61/465 • • • • for achieving a target input speed **[2010.01]**
61/468 • • • • for achieving a target input torque **[2010.01]**
61/47 • • • • for achieving a target output speed **[2010.01]**
61/472 • • • • for achieving a target output torque **[2010.01]**
61/475 • • • • for achieving a target power, e.g. input power or output power **[2010.01]**
61/478 • • • • for preventing overload, e.g. high pressure limitation **[2010.01]**
61/48 • • hydrodynamic **[5]**
61/50 • • • controlled by changing the flow, force, or reaction of the liquid in the working circuit, while maintaining a completely filled working circuit **[5]**
61/52 • • • • by altering the position of blades **[5]**
61/54 • • • • • by means of axially-shiftable blade runners **[5]**
61/56 • • • • • to change the blade angle **[5]**
61/58 • • • • by change of the mechanical connection of, or between, the runners **[5]**
61/60 • • • • • exclusively by the use of freewheel clutches **[5]**
61/62 • • • • • involving use of a speed-changing gearing or of a clutch in the connection between runners (F16H 45/02, F16H 61/60 take precedence) **[5]**
61/64 • • • controlled by changing the amount of liquid in the working circuit **[5]**
61/66 • specially adapted for continuously variable gearings (F16H 61/38 takes precedence; orbital toothed gearings with a secondary drive in order to vary the speed continuously F16H 3/72) **[2006.01]**
61/662 • • with endless flexible members **[2006.01]**
61/664 • • Friction gearings **[2006.01]**
61/68 • specially adapted for stepped gearings **[2006.01]**
61/682 • • with interruption of drive **[2006.01]**
61/684 • • without interruption of drive **[2006.01]**
61/686 • • • with orbital gears **[2006.01]**
61/688 • • • with two inputs, e.g. selection of one of two torque-flow paths by clutches **[2006.01]**
61/70 • specially adapted for change-speed gearing in group arrangement, i.e. with separate change-speed gear trains arranged in series, e.g. range or overdrive-type gearing arrangements **[2006.01]**

63/00 **Control outputs to change-speed- or reversing-gearings for conveying rotary motion [5]**
63/02 • Final output mechanisms therefor; Actuating means for the final output mechanisms **[5]**
63/04 • • a single final output mechanism being moved by a single final actuating mechanism **[5]**
63/06 • • • the final output mechanism having an indefinite number of positions **[5]**
63/08 • • Multiple final output mechanisms being moved by a single common final actuating mechanism **[5]**
63/10 • • • the final actuating mechanism having a series of independent ways of movement, each way of movement being associated with only one final output mechanism **[5]**
63/12 • • • • two or more ways of movement occurring simultaneously **[5]**
63/14 • • • the final output mechanisms being successively actuated by repeated movement of the final actuating mechanism **[5]**
63/16 • • • the final output mechanisms being successively actuated by progressive movement of the final actuating mechanism **[5]**
63/18 • • • • the final actuating mechanism comprising cams **[5]**
63/20 • • • with preselection and subsequent movement of each final output mechanism by movement of the final actuating mechanism in two different ways, e.g. guided by a shift gate **[5]**
63/22 • • • • the final output mechanisms being simultaneously moved by the final actuating mechanism **[5]**
63/24 • • each of the final output mechanisms being moved by only one of the various final actuating mechanisms **[5]**
63/26 • • • some of the movements of the final output mechanisms being caused by another final output mechanism **[5]**
63/28 • • two or more final actuating mechanisms moving the same final output mechanism **[5]**
63/30 • • Constructional features of the final output mechanisms **[5]**
63/32 • • • Gear shifter yokes **[5]**
63/34 • • • Locking or disabling mechanisms **[5]**
63/36 • • • • Interlocking devices **[5]**
63/38 • • • Detents **[5]**
63/40 • comprising signals other than signals for actuating the final output mechanisms **[5]**
63/42 • • Ratio indicator devices **[5]**
63/44 • • Signals to the control unit of auxiliary gearing **[5]**
63/46 • • Signals to a clutch outside the gearbox **[5]**
63/48 • • Signals to a parking brake **[5]**
63/50 • • Signals to an engine or motor **[7]**

F16J PISTONS; CYLINDERS; PRESSURE VESSELS IN GENERAL; SEALINGS

Note(s)

Attention is drawn to the following places:

A47J 27/08.....Pressure cookers
E04B 1/68.....Sealing building joints
E05C 9/00.....Multi-point fastening of wings in general
F01B.....Machines or engines in general or of reciprocating type, e.g. cylinders peculiar to steam engines F01B 31/28
F02F 1/00.....Cylinders for combustion engines
F02F 3/00.....Pistons for combustion engines
F04D 29/08.....Sealings of non-positive displacement pumps
F17B 1/04.....Sealing devices for sliding parts of gas holders of variable capacity
F28F 9/04.....Arrangements for sealing elements into header boxes or end plates of heat-exchangers.

Subclass index

1/00 **Pistons; Trunk pistons; Plungers** (bellows pistons F16J 3/06; piston-rings or seats therefor F16J 9/00; rotary pistons, e.g. for "Wankel" type engines, F01C; specific for combustion engines, i.e. constructed to withstand high temperature or modified for guiding, igniting, vaporising, or otherwise treating the charge, F02F; pistons specially adapted for reciprocating-piston liquid engines F03C 1/28; for pumps F04B; floats F16K 33/00)
1/01 • characterised by the use of particular materials (F16J 1/02 takes precedence) **[3]**
1/02 • Bearing surfaces
1/04 • Resilient guiding parts, e.g. skirts, particularly for trunk pistons
1/06 • • with separate expansion members; Espansion members
1/08 • Constructional features providing for lubrication
1/09 • with means for guiding fluids (F16J 1/08 takes precedence) **[3]**
1/10 • Connection to driving members
1/12 • • with piston-rods, i.e. rigid connections
1/14 • • with connecting-rods, i.e. pivotal connections
1/16 • • • with gudgeon-pin; Gudgeon-pins

1/18 • • • • Securing of gudgeon-pins
1/20 • • • with rolling contact, other than in ball or roller bearings
1/22 • • • with universal joint, e.g. ball-joint
1/24 • • designed to give the piston some rotary movement about its axis

3/00 **Diaphragms; Bellows; Bellows pistons** (connection of valves to inflatable elastic bodies B60C 29/00; bellows or the like used in instruments G12B 1/04; diaphragms for electromechanical transducers H04R 7/00)
3/02 • Diaphragms **[2]**
3/04 • Bellows **[2]**
3/06 • Bellows pistons **[2]**

7/00 **Piston-rods, i.e. rods rigidly connected to the piston** (connecting-rods or like links pivoted at both ends F16C 7/00)

9/00 **Piston-rings, seats therefor; Ring sealings of similar construction in general** (other sealings between pistons and cylinders F16J 3/06, F16J 15/16; tools for mounting or removing piston-rings or the like B25B; piston sealing arrangements on brake master cylinders B60T 11/236) **[2, 5]**
9/02 • L-section rings
9/04 • Helical rings
9/06 • using separate springs expanding the rings; Springs therefor
9/08 • with expansion obtained by pressure of the medium
9/10 • Special members for adjusting the rings
9/12 • Details
9/14 • • Joint-closures
9/16 • • • obtained by stacking of rings
9/18 • • • with separate bridge-elements
9/20 • • Rings with special cross-section (L-section rings F16J 9/02); Oil-scraping rings
9/22 • • Rings for preventing wear of grooves or like seatings
9/24 • • Members preventing rotation of rings in grooves
9/26 • characterised by the use of particular materials **[3]**
9/28 • • of non-metals **[3]**

10/00 **Engine or like cylinders** (pressure vessels in general F16J 12/00; cylinders for engines or other apparatus of particular kinds, see the appropriate subclasses, e.g. for combustion engines F02F)**; Features of hollow, e.g. cylindrical, bodies in general [3]**
10/02 • Cylinders designed to receive moving pistons or plungers **[3]**
10/04 • • Running faces; Liners **[3]**

12/00 **Pressure vessels in general** (covers therefor F16J 13/00; for particular applications, see the relevant subclasses, e.g. B01J, F17C, G21C) **[3]**

13/00 **Covers or similar closure members for pressure vessels in general** (for engine or like cylinders F16J 10/00; sealings F16J 15/02; covers for box-like containers B65D 43/00; devices for securing or retaining closure members B65D 45/00; closures for containers not otherwise provided for B65D 51/00; manholes, covers for large containers B65D 90/10; gates or closures for large containers B65D 90/54; for vessels for containing or storing compressed, liquefied or solidified gases F17C 13/06; steam boilers F22B)
13/02 • Detachable closure members; Means for tightening closures (F16J 13/16, F16J 13/22 take precedence) **[3]**
13/04 • • attached with a bridge member
13/06 • • attached only by clamps along the circumference
13/08 • • attached by one or more members actuated to project behind a part or parts of the frame (similar constructions for doors or windows E05C 9/00)
13/10 • • attached by means of a divided ring
13/12 • • attached by wedging action by means of screw-thread, interrupted screw-thread, bayonet closure, or the like
13/14 • • attached exclusively by spring action or elastic action
13/16 • Pivoted closures (F16J 13/22 takes precedence) **[3]**
13/18 • • pivoted directly on the frame
13/20 • • mounted by mobile fastening on swinging arms
13/22 • with movement parallel to the plane of the opening **[3]**
13/24 • with safety devices, e.g. to prevent opening prior to pressure release **[3]**

15/00 **Sealings** (sealing arrangements for vehicle windows, windscreens, non-fixed roofs, doors, or similar devices B60J 10/00; sealing or packing elements for container closures B65D 53/00; sealing arrangements in rotary-piston machines or engines F01C 19/00; sealings in non-positive-displacement machines or engines F01D 11/00; arrangements of sealings in combustion engines F02F 11/00; sealing arrangements in rotary-piston pumps F04C 27/00; sealing lead-in or lead-through insulators H01B 17/30) **[5]**
15/02 • between relatively-stationary surfaces (F16J 15/46, F16J 15/48 take precedence)
15/04 • • without packing between the surfaces, e.g. with ground surfaces, with cutting edge
15/06 • • with solid packing compressed between sealing surfaces
15/08 • • • with exclusively metal packing
15/10 • • • with non-metallic packing
15/12 • • • • with metal reinforcement or covering
15/14 • • by means of granular or plastic material, or fluid
15/16 • between relatively-moving surfaces (F16J 15/50, F16J 15/52 take precedence; bellows pistons F16J 3/06; piston-rings or ring sealings of similar construction in general F16J 9/00; spindle sealings for valves F16K 41/00) **[2]**
15/18 • • with stuffing-boxes for elastic or plastic packings
15/20 • • • Packing materials therefor
15/22 • • • • shaped as strands, ropes, threads, ribbons, or the like
15/24 • • • with radially or tangentially compressed packing
15/26 • • with stuffing-boxes for rigid sealing rings
15/28 • • • with sealing rings made of metal
15/30 • • • with sealing rings made of carbon
15/32 • • with elastic sealing lip
15/34 • • with slip-ring pressed against a more or less radial face on one member
15/36 • • • connected by a diaphragm to the other member
15/38 • • • sealed by a packing **[2]**
15/40 • • by means of fluid
15/42 • • • kept in sealing position by centrifugal force
15/43 • • • kept in sealing position by magnetic force **[6]**
15/44 • Free-space packings
15/447 • • Labyrinth packings **[3]**

15/453 • • • characterised by the use of particular materials **[3]**
15/46 • with packing ring expanded or pressed into place by fluid pressure, e.g. inflatable packings (connection of valves to inflatable elastic bodies B60C 29/00; specially adapted for tube connections F16L)
15/48 • • influenced by the pressure within the member to be sealed
15/50 • between relatively-movable members, by means of a sealing without relatively-moving surfaces, e.g. fluid-tight sealings for transmitting motion through a wall
15/52 • • by means of sealing bellows or diaphragms (connection of valves to inflatable elastic bodies B60C 29/00)
15/53 • using magnetic means **[6]**
15/54 • Other sealings for rotating shafts
15/56 • Other sealings for reciprocating rods

F16K VALVES; TAPS; COCKS; ACTUATING-FLOATS; DEVICES FOR VENTING OR AERATING

Note(s)

1. Attention is drawn to the Notes following the titles of class B81 and subclass B81B relating to "micro-structural devices" and "micro-structural systems".
2. Attention is drawn to Note (2) following the title of subclass G05D and also the subdivisions of that subclass, according to which pressure regulators and flow regulators, e.g. flow regulating valves with pressure compensator, even with the whole regulating system contained in a valve, operating with or without auxiliary power, are covered by groups G05D 16/00 or G05D 7/00, respectively. However, details of the valve parts, per se, are classified in the appropriate groups of this subclass.
3. Attention is drawn to the following places:

A47J 27/09.....Safety devices for pressure cookers
A47J 31/46.....Dispensing spouts, drain valves or like beverage-making apparatus
A61B 5/0235.....Valves specially adapted for measuring pressure in heart or blood vessels
A61F 2/24.....Heart valves
A61M 16/20.....Valves specially adapted for medical respiratory devices
A61M 39/00.....Tube connectors, tube couplings, valves or branch units specially adapted for medical use in general
A62B 9/02.....Valves for respiratory apparatus
A62B 18/10.....Valves for breathing masks or helmets
A62C.....Fire extinguishers
B05B.....Nozzles, spray heads or other discharge apparatus for spraying or atomising
B60C 29/00.....Arrangements of tyre-inflating valves relative to tyres or wheel rims; Connection of valves to wheel rims, tyres or other inflatable elastic bodies
B60G 17/048.....Valves specially adapted for adjusting vehicle fluid-spring characteristics
B60T.....Valves specially adapted for vehicle brake control systems
B62D 5/08.....Vehicle power-assisted steering characterised by the type of valve used
B63B 7/00, B63C 9/00.....Arrangement of inflating valves for floatable live-saving equipment
B65D 47/04.....Container closures with discharging valves
B65D 83/28, B65D 83/44.....Nozzles or valves specially adapted for aerosol containers
B65D 90/32.....Safety valves for large containers
B65D 90/54.....Gates or closures on large containers
B67C 3/28.....Flow control devices for bottling liquids
B67D.....Dispensing, delivering or transferring liquids
E02B 8/00.....Details, e.g. valves, of barrages or weirs
E02B 13/02.....Closures for irrigation conduits
E03B 9/02.....Arrangement of valves in hydrants
E03D.....Flushing valves for water-closets or urinals
E05F 3/12.....Valve arrangement in door closers
E21B 21/10.....Valve arrangements in drilling-fluid circulation systems
E21B 34/00.....Valve arrangements for boreholes or wells
F01B 25/10.....Working-fluid valves for controlling machines or engines in general or of positive-displacement type
F01D 17/10.....Final actuators for controlling non-positive displacement machines or engines
F01L.....Cyclically operated valves for machines or engines
F02D 9/08.....Throttle valves for controlling combustion engines
F02K 9/58.....Propellant feed valves for rocket-engines
F02M.....Carburettors, fuel injection
F02M 59/46.....Valves for fuel injection pumps
F04.....Pumps
F16F 9/34.....Valves for shock absorbers
F16L 29/00, F16L 37/28.....Pipe joints or quick-acting couplings with fluid cut-off means
F16L 55/00.....Arrangement of valves in pipes
F16L 55/055.....Valves specially adapted to prevent or minimise the effect of water hammer
F16L 55/46.....Launching devices for pigs or moles
F16N 23/00.....Check valves for lubrication systems
F17C 13/04.....Arrangement of valves in pressure vessels
F22B 37/44.....Arrangement of safety valves on steam boilers
F22D 5/34.....Application of valves to automatic water-feed in boiler
F23L 13/00.....Valves for air supply control to burners

F23Q 2/173.....Valves for lighters with gaseous fuel and adjustable flame
F24C 3/12, F24C 5/16.....Arrangement of valves on stoves or ranges
F24F.....Air conditioning; Ventilation
F25B 41/04.....Disposition of fluid circulation valves in refrigeration machines
G05D.....Controlling non-electric variables
G10B 3/06.....Valves for organs
G10D 9/04.....Valves for other wind-actuated musical instruments.

Subclass index

Constructional types

Note(s)

In groups F16K 1/00-F16K 13/00, an initial seal breaking or final sealing movement which is different from the opening or closing movement of the valve is not considered in determining the movement to be classified.

1/00 **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** (diaphragm valves F16K 7/00)

1/02 • with screw-spindle (F16K 1/12-F16K 1/28 take precedence; actuating mechanisms with screw-spindles F16K 31/50)

1/04 • • with a cut-off member rigid with the spindle, e.g. main valves

1/06 • • Special arrangements for improving the flow, e.g. special shape of passages or casings

1/08 • • • in which the spindle is perpendicular to the general direction of flow

1/10 • • • in which the spindle is inclined to the general direction of flow

1/12 • with streamlined valve member around which the fluid flows when the valve is opened

1/14 • with ball-shaped valve members (check valves F16K 15/04)

1/16 • with pivoted closure members

1/18 • • with pivoted discs or flaps

1/20 • • • with axis of rotation arranged externally of valve member

1/22 • • • with axis of rotation crossing the valve member, e.g. butterfly valves

1/226 • • • • Shape or arrangement of the sealing

1/228 • • • • • Movable sealing bodies

1/24 • with valve members that, on opening of the valve, are initially lifted from the seat and next are turned around an axis parallel to the seat

1/26 • • Shape or arrangement of the sealing

1/28 • • • Movable sealing bodies

1/30 • specially adapted for pressure containers

1/32 • Details (details of more general applicability F16K 25/00-F16K 51/00)

1/34 • • Cutting-off parts (F16K 1/06, F16K 1/12, F16K 1/14, F16K 1/26 take precedence)

1/36 • • • Valve members (for double-seat valves F16K 1/44)

1/38 • • • • • of conical shape

1/40 • • • • • of helical shape

1/42 • • • Valve seats (for double-seat valves F16K 1/44)

1/44 • • • Details of seats or valve members of double-seat valves

1/46 • • • Attachment of sealing rings

1/48 • • Attaching valve members to valve-spindles **[4]**

1/50 • • Preventing rotation of valve members

1/52 • • Means for additional adjustment of the rate of flow

1/54 • • Arrangements for modifying the way in which the rate of flow varies during the actuation of the valve

3/00 **Gate valves or sliding valves, i.e. cut-off apparatus with closing members having a sliding movement along the seat for opening and closing** (F16K 5/00 takes precedence; in barrages or weirs E02B 8/04)

3/02 • with flat sealing faces; Packings therefor

3/03 • • with a closure member in the form of an iris-diaphragm

3/04 • • with pivoted closure members

3/06 • • • in the form of closure plates arranged between supply and discharge passages (F16K 3/10 takes precedence)

3/08 • • • • with circular closure plates rotatable around their centres

3/10 • • • with special arrangements for separating the sealing faces or for pressing them together

3/12 • • with wedge-shaped arrangements of sealing faces

3/14 • • • with special arrangements for separating the sealing faces or for pressing them together

3/16 • • with special arrangements for separating the sealing faces or for pressing them together (F16K 3/10, F16K 3/14 take precedence)
3/18 • • • by movement of the closure members
3/20 • • • by movement of the seats
3/22 • with sealing faces shaped as surfaces of solids of revolution (F16K 13/02 takes precedence; with resilient valve members F16K 3/28)
3/24 • • with cylindrical valve members
3/26 • • • with fluid passages in the valve member
3/28 • with resilient valve members
3/30 • Details
3/312 • • Line blinds
3/314 • • Forms or constructions of slides; Attachment of the slide to the spindle
3/316 • • Guiding of the slide
3/32 • • Means for additional adjustment of the rate of flow
3/34 • • Arrangements for modifying the way in which the rate of flow varies during the actuation of the valve
3/36 • • Features relating to lubrication

5/00 Taps or cocks comprising only cut-off apparatus having at least one of the sealing faces shaped as a more or less complete surface of a solid of revolution, the opening and closing movement being predominantly rotary (taps of the lift-valve type F16K 1/00)
5/02 • with plugs having conical surfaces; Packings therefor
5/04 • with plugs having cylindrical surfaces; Packings therefor
5/06 • with plugs having spherical surfaces; Packings therefor
5/08 • Details
5/10 • • Means for additional adjustment of the rate of flow
5/12 • • Arrangements for modifying the way in which the rate of flow varies during the actuation of the valve
5/14 • • Special arrangements for separating the sealing faces or for pressing them together
5/16 • • • for plugs with conical surfaces
5/18 • • • for plugs with cylindrical surfaces
5/20 • • • for plugs with spherical surfaces
5/22 • • Features relating to lubrication

7/00 Diaphragm cut-off apparatus, e.g. with a member deformed, but not moved bodily, to close the passage (container gates or closures operating by deformation of flexible walls B65D 90/56; means for plugging pipes or hoses F16L 55/10)
7/02 • with tubular diaphragm
7/04 • • constrictable by external radial force
7/06 • • • by means of a screw-spindle, cam, or other mechanical means
7/07 • • • by means of fluid pressure
7/08 • • constrictable by twisting
7/10 • with inflatable member
7/12 • with flat, dished, or bowl-shaped diaphragm
7/14 • • arranged to be deformed against a flat seat
7/16 • • • the diaphragm being mechanically actuated, e.g. by screw-spindle or cam
7/17 • • • the diaphragm being actuated by fluid pressure
7/18 • with diaphragm secured at one side only, e.g. to be laid on the seat by rolling action
7/20 • with a compressible solid closure member

11/00 Multiple-way valves, e.g. mixing valves; Pipe fittings incorporating such valves; Arrangement of valves and flow lines specially adapted for mixing fluid [4]
11/02 • with all movable sealing faces moving as one unit
11/04 • • comprising only lift valves
11/044 • • • with movable valve members positioned between valve seats **[4]**
11/048 • • • with valve seats positioned between movable valve members **[4]**
11/052 • • • with pivoted closure members, e.g. butterfly valves **[4]**
11/056 • • • with ball-shaped valve members **[4]**
11/06 • • comprising only sliding valves
11/065 • • • with linearly sliding closure members **[4]**
11/07 • • • • with cylindrical slides **[4]**
11/072 • • • with pivoted closure members **[4]**
11/074 • • • • with flat sealing faces **[4]**
11/076 • • • • with sealing faces shaped as surfaces of solids of revolution **[4]**
11/078 • • • with pivoted and linearly movable closure members **[4]**
11/08 • • comprising only taps or cocks
11/083 • • • with tapered plug **[2]**
11/085 • • • with cylindrical plug **[2]**
11/087 • • • with spherical plug **[2]**
11/10 • with two or more closure members not moving as a unit
11/12 • • with one plug turning in another
11/14 • • operated by one actuating member, e.g. a handle (with one plug turning in another F16K 11/12)
11/16 • • • which only slides, or only turns, or only swings in one plane
11/18 • • • with separate operating movements for separate closure members
11/20 • • operated by separate actuating members (with one plug turning in another F16K 11/12)
11/22 • • • with an actuating member for each valve, e.g. interconnected to form multiple-way valves
11/24 • • • with an electromagnetically-operated valve, e.g. for washing machines

13/00 Other constructional types of cut-off apparatus (means for plugging pipes or hoses F16L 55/10)**; Arrangements for cutting-off [4]**
13/02 • with both sealing faces shaped as small segments of a cylinder and the moving member pivotally mounted
13/08 • Arrangements for cutting-off **[4]**
13/10 • • by means of liquid or granular medium **[4]**

Functional types

15/00 Check valves (valves specially adapted for inflatable balls A63B 41/00)
15/02 • with guided rigid valve members
15/03 • • with a hinged closure member
15/04 • • shaped as balls
15/06 • • with guided stems
15/08 • • shaped as rings
15/10 • • • integral with, or rigidly fixed to, a common valve plate
15/12 • • • Springs for ring valves **[3]**
15/14 • with flexible valve members
15/16 • • with tongue-shaped laminae

15/18 • with actuating mechanism; Combined check valves and actuated valves
15/20 • specially designed for inflatable bodies, e.g. tyres (connecting valves to inflatable elastic bodies B60C 29/00)

17/00 Safety valves; Equalising valves (pressure relief devices for aerosol containers B65D 83/70)
17/02 • opening on surplus pressure on one side; closing on insufficient pressure on one side (check valves F16K 15/00)
17/04 • • spring-loaded
17/06 • • • with special arrangements for adjusting the opening pressure
17/08 • • • with special arrangements for providing a large discharge passage
17/10 • • • with auxiliary valve for fluid operation of the main valve
17/12 • • weight-loaded
17/14 • • with fracturing member
17/16 • • • with fracturing diaphragm
17/164 • • and remaining closed after return of the normal pressure
17/168 • • combined with manually-controlled valves, e.g. a valve combined with a safety valve
17/18 • opening on surplus pressure on either side
17/19 • • Equalising valves predominantly for tanks
17/192 • • • with closure member in the form of a movable liquid column
17/194 • • • weight-loaded
17/196 • • • spring-loaded
17/20 • Excess-flow valves (actuated in consequence of shock or similar extraneous influence F16K 17/36)
17/22 • • actuated by the difference of pressure between two places in the flow line
17/24 • • • acting directly on the cutting-off member
17/26 • • • • operating in either direction
17/28 • • • • operating in one direction only
17/30 • • • • • spring-loaded
17/32 • • • acting on a servo-mechanism or on a catch-releasing mechanism
17/34 • • in which the flow-energy of the flowing medium actuates the closing mechanism
17/36 • actuated in consequence of extraneous circumstances, e.g. shock, change of position
17/38 • • of excessive temperature
17/40 • with fracturing member, e.g. fracturing diaphragm, fusible joint (valves with fracturing member opening on surplus pressure on one side F16K 17/14)
17/42 • Valves preventing penetration of air in the outlet of containers for liquids

21/00 Fluid-delivery valves (specially adapted for aerosol containers B65D 83/44; for liquid handling B67D; for flushing devices for water-closets or the like E03D)
21/02 • providing a continuous small flow
21/04 • Self-closing valves, i.e. closing automatically after operation
21/06 • • in which the closing movement, either retarded or not, starts immediately after opening
21/08 • • • with ball-shaped closing members
21/10 • • • with hydraulic brake cylinder acting on the closure member
21/12 • • • with hydraulically-operated opening means; with arrangements for pressure relief before opening
21/14 • • with special means for preventing the self-closing
21/16 • • closing after a predetermined quantity of fluid has been delivered (F16K 21/10 takes precedence)
21/18 • • closed when a rising liquid reaches a predetermined level (float-actuated valves F16K 31/18)
21/20 • • • by means making use of air-suction through an opening closed by the rising liquid

23/00 Valves for preventing drip from nozzles

24/00 Devices, e.g. valves, for venting or aerating enclosures (equalising valves F16K 17/00; arrangement or mounting in pipes or pipe systems F16L 55/07; venting or aerating as an additional function of steam traps or like apparatus F16T; ventilation of rooms, vehicles, see the appropriate subclass, e.g. F24F) **[2]**
24/02 • the enclosure being itself a valve, tap, or cock **[2]**
24/04 • for venting only (F16K 24/02 takes precedence) **[2]**
24/06 • for aerating only (F16K 24/02 takes precedence) **[2]**

Details

Note(s)

Details not provided for in groups F16K 25/00-F16K 51/00 are classified in groups F16K 1/00-F16K 24/00.

25/00 Details relating to contact between valve members and seats (movement of valve members other than for opening and closing F16K 29/00; sealing constructions, see the appropriate groups according to the type of valve)
25/02 • Arrangements using fluid issuing from valve members or seats
25/04 • Arrangements for preventing erosion, not otherwise provided for

27/00 Construction of housings (methods for welding housings B23K)**; Use of materials therefor**
27/02 • of lift valves (for reducing the flow resistance of screw-spindle lift-valves F16K 1/06)
27/04 • of sliding valves
27/06 • of taps or cocks
27/07 • of cutting-off parts of tanks, e.g. tank-cars **[4]**
27/08 • Guiding yokes for spindles; Means for closing housings; Dust caps, e.g. for tyre valves
27/10 • Welded housings
27/12 • Covers for housings

29/00 Arrangements for movement of valve members other than for opening or closing the valve, e.g. for grinding-in, for preventing sticking
29/02 • providing for continuous motion

31/00 Operating means; Releasing devices
31/02 • electric; magnetic
31/04 • • using a motor
31/05 • • • specially adapted for operating hand-operated valves or for combined motor and hand operation
31/06 • • using a magnet
31/08 • • • using a permanent magnet
31/10 • • • with additional mechanism between armature and closure member
31/11 • • • • with additional hand operating means **[2]**

31/12 • actuated by fluid (fluid-actuated check valves F16K 15/00; fluid-actuated safety valves F16K 17/00)
31/122 • • the fluid acting on a piston (F16K 31/143, F16K 31/163, F16K 31/363, F16K 31/383 take precedence) **[2]**
31/124 • • • servo actuated **[2]**
31/126 • • the fluid acting on a diaphragm, bellows, or the like (F16K 31/145, F16K 31/165, F16K 31/365, F16K 31/385 take precedence) **[2]**
31/128 • • • servo actuated **[2]**
31/14 • • for mounting on, or in combination with, hand-actuated valves
31/143 • • • the fluid acting on a piston
31/145 • • • the fluid acting on a diaphragm
31/16 • • with a mechanism, other than pulling- or pushing-rod, between fluid motor and closure member (with float F16K 31/18)
31/163 • • • the fluid acting on a piston
31/165 • • • the fluid acting on a diaphragm
31/18 • • actuated by a float (floats F16K 33/00; float-actuated valves in steam-traps F16T 1/20, in boilers F22D 5/08)
31/20 • • • actuating a lift valve
31/22 • • • • with the float rigidly connected to the valve
31/24 • • • • with a transmission with parts linked together from a single float to a single valve
31/26 • • • • • with the valve guided for rectilinear movement and the float attached to a pivoted arm
31/28 • • • • with two or more floats actuating one valve
31/30 • • • actuating a gate valve or sliding valve
31/32 • • • actuating a tap or cock
31/34 • • • acting on pilot valve controlling the cut-off apparatus
31/36 • • in which fluid from the conduit is constantly supplied to the fluid motor
31/363 • • • the fluid acting on a piston (F16K 31/38 takes precedence)
31/365 • • • the fluid acting on a diaphragm
31/38 • • • in which the fluid works directly on both sides of the fluid motor, one side being connected by means of a restricted passage and the motor being actuated by operating a discharge from that side (F16K 31/40 takes precedence)
31/383 • • • • the fluid acting on a piston
31/385 • • • • the fluid acting on a diaphragm
31/40 • • • with electrically-actuated member in the discharge of the motor
31/42 • • by means of electrically-actuated members in the supply or discharge conduits of the fluid motor (F16K 31/40 takes precedence)
31/44 • Mechanical actuating means
31/46 • • for remote operation
31/48 • • actuated by mechanical timing-device, e.g. with dash-pot (self-closing valves F16K 21/16)
31/50 • • with screw-spindle
31/52 • • with crank, eccentric, or cam
31/524 • • • with a cam
31/528 • • • with pin and slot
31/53 • • with toothed gearing
31/54 • • • with pinion and rack
31/56 • • without stable intermediate position, e.g. with snap action
31/58 • • comprising a movable discharge-nozzle
31/60 • • Handles
31/62 • • Pedals or like operating members, e.g. actuated by knee or hip
31/64 • responsive to temperature variation (dependant on excessive temperature F16K 17/38; control of fire-fighting equipment A62C 37/00; devices for preventing bursting of water pipes by freezing E03B 7/10) **[4]**
31/66 • • electrically or magnetically actuated, e.g. by magnets with variable magnetic characteristics **[4]**
31/68 • • actuated by fluid pressure or volumetric variation in a confined chamber **[4]**
31/70 • • mechanically actuated, e.g. by a bimetallic strip **[4]**
31/72 • Operating means or releasing devices specifically adapted to enhance the speed of valve response **[4]**

33/00 Floats for actuation of valves or other apparatus

35/00 Means to prevent accidental or unauthorised actuation
35/02 • to be locked or disconnected by means of a push or pull
35/04 • yieldingly resisting the actuation
35/06 • using a removable actuating or locking member, e.g. a key (F16K 35/10, F16K 35/12 take precedence)
35/08 • requiring setting according to a code, e.g. permutation locks
35/10 • with locking caps or locking bars
35/12 • with sealing wire
35/14 • interlocking two or more valves
35/16 • with locking member actuated by magnet

37/00 Special means in or on valves or other cut-off apparatus for indicating or recording operation thereof, or for enabling an alarm to be given

39/00 Devices for relieving the pressure on the sealing faces
39/02 • for lift valves
39/04 • for sliding valves
39/06 • for taps or cocks

41/00 Spindle sealings
41/02 • with stuffing-box
41/04 • • with at least one ring of rubber or like material between spindle and housing
41/06 • • with at least one ring attached to both spindle and housing
41/08 • • with at least one ring provided with axially-protruding peripheral closing-lip
41/10 • with diaphragm, e.g. shaped as bellows or tube
41/12 • • with approximately flat diaphragm
41/14 • with conical flange on the spindle which co-operates with a conical surface in the housing
41/16 • with a flange on the spindle which rests on a sealing ring
41/18 • • sealing only when the closure member is in the opened position

43/00 Auxiliary closure means in valves, which in case of repair, e.g. rewashering, of the valve, can take over the function of the normal closure means; Devices for temporary replacement of parts of valves for the same purpose

47/00 Means in valves for absorbing fluid energy (for pipes F16L 55/00)
47/02 • for preventing water-hammer or noise

47/04 • for decreasing pressure, the throttle being incorporated in the closure member
47/06 • • with a throttle in the form of a helical channel
47/08 • for decreasing pressure and having a throttling member separate from the closure member
47/10 • • in which the medium in one direction must flow through the throttling channel, and in the other direction may flow through a much wider channel parallel to the throttling channel
47/12 • • the throttling channel being of helical form
47/14 • • the throttling member being a perforated membrane
47/16 • • the throttling member being a cone

49/00 Means in or on valves for heating or cooling (for pipes F16L 53/00; thermal insulation in connection with pipes or pipe systems F16L 59/16)

51/00 Other details not peculiar to particular types of valves or cut-off apparatus
51/02 • specially adapted for high-vacuum installations **[2]**

99/00 Subject matter not provided for in other groups of this subclass [2006.01]

F16L PIPES; JOINTS OR FITTINGS FOR PIPES; SUPPORTS FOR PIPES, CABLES OR PROTECTIVE TUBING; MEANS FOR THERMAL INSULATION IN GENERAL

Note(s)

1. In this subclass, the following terms are used with the meanings indicated:
   - "pipe" means a conduit of closed cross-section, which is specially adapted to convey fluids, materials or objects;
   - "hose" means a pipe, as defined above, which has flexibility as an essential characteristic.
2. Attention is drawn to the following places:
   - A61M 39/00.....Tube connectors, tube couplings or branch units, specially adapted for medical use
   - B05B 1/20.....Perforated pipes
   - B63B 35/03.....Pipe-laying vessels
   - B64D 39/04.....Adaptation of hose constructions for refuelling aircraft during flight
   - B67D 7/38.....Arrangements of hoses in apparatus for transferring liquids, e.g. fuel, from bulk to vehicles or portable containers
   - E01D 19/10.....Fastening of pipes or cables to bridges
   - E03B.....Water supply installations
   - E03D 11/17.....Means for connecting water-closet bowls to the flushing pipe
   - E03D 11/18.....Siphons for water-closets
   - E03F 3/04.....Pipes or fittings specially adapted to sewers
   - E04D 13/08.....Down pipes for roof drainage; Clamping means therefor
   - E04F 17/00.....Vertical ducts, channels in buildings, e.g. chimneys
   - E21F 1/04.....Air ducts for ventilation of mines or tunnels; Connections therefor
   - E21F 17/02.....Suspension devices for tubes or the like in mines or tunnels
   - F01N.....Gas flow silencers or exhaust apparatus for machines or engines
   - F16N 21/00.....Conduits, junctions for lubrication systems
   - F17C 3/02.....Thermal insulation of vessels not under pressure for storing liquified or solidified gases, e.g. Dewar flask
   - F22B 37/10.....Water tubes of steam boilers
   - F23J 13/04.....Joints, connections for chimneys or flues
   - F24H 9/12.....Connecting circulation pipes to heaters
   - F28F 9/04.....Arrangements for sealing elements into header boxes or end plates of heat-exchangers
   - G21C 15/22.....Structural association of coolant tubes with headers or other pipes in nuclear reactors
   - H02G 3/04.....Protective tubing or conduits for electric cables
   - H02G 3/30.....Installations of electric cables or lines on walls, floors or ceilings
   - H02G 3/36.....Installations of electric cables or lines in walls, floors or ceilings

Subclass index

1/00 **Laying or reclaiming pipes; Repairing or joining pipes on or under water** (soldering or welding B23K; lifting-gear and load-engaging elements B66; hydraulic installations, soil drainage E02B; excavations or underwater constructions E02D; machines for digging trenches in combination with pipe-assembly E02F; laying sewer pipes E03F 3/06; in earth boreholes or wells E21B; tunnelling E21D; laying electric, or combined optical and electric, cables H02G; making special pipe joints, see the relevant groups for the joints) **[2, 5, 6]**

1/024 • Laying or reclaiming pipes on land, e.g. above the ground (F16L 1/12 takes precedence) **[5]**

1/026 • • in or on a frozen surface **[6]**

1/028 • • in the ground (F16L 1/026 takes precedence) **[5, 6]**

1/032 • • • the pipes being continuous (F16L 1/038 takes precedence) **[5, 6]**

1/036 • • • the pipes being composed of sections of short length (F16L 1/038 takes precedence) **[5, 6]**

1/038 • • • the pipes being made in situ **[6]**

1/06 • • Accessories therefor, e.g. anchors **[5]**

1/09 • • • for bringing two tubular members closer to each other **[6]**

1/10 • • • for aligning **[5]**

1/11 • • • for the detection or protection of pipes in the ground **[6]**

1/12 • Laying or reclaiming pipes on or under water (buoyant hoses F16L 11/133) **[5]**

1/14 • • between the surface and the bottom **[5]**

1/15 • • • vertically **[6]**

1/16 • • on the bottom **[5]**

1/18 • • • the pipes being S- or J-shaped and under tension during laying **[5]**

1/19 • • • • the pipes being J-shaped **[6]**

1/20 • • Accessories therefor, e.g. floats, weights (buoys B63B 22/00) **[5]**

1/225 • • • Stingers **[6]**

1/23 • • • Pipe tensioning apparatus **[6]**

1/235 • • • Apparatus for controlling the pipe during laying **[6]**

1/24 • • • Floats; Weights **[5]**

1/26 • Repairing or joining pipes on or under water (buoyant hoses F16L 11/133; joints per se F16L 13/00-F16L 49/00) **[5]**

3/00 **Supports for pipes, cables or protective tubing, e.g. hangers, holders, clamps, cleats, clips, brackets** (anchors for holding pipes on or under the ground F16L 1/06; noise absorbers in the form of specially adapted hangers or supports F16L 55/035; arrangements specially adapted for supporting insulated bodies F16L 59/12) **[5, 7]**

3/01 • for supporting or guiding the pipes, cables or protective tubing, between relatively movable points, e.g. movable channels (hauling- or hoisting-chains with arrangements for holding electric cables, hoses or the like F16G 13/16) **[5]**

3/015 • • using articulated- or supple-guiding elements (arrangements for cranes of means for transmitting pneumatic, hydraulic or electric power to movable parts or devices B66C 13/12) **[6]**

3/02 • partly surrounding the pipes, cables or protective tubing (bands or chains F16L 3/14)

3/04 • • and pressing it against a wall or other support

3/06 • • with supports for wires

3/08 • substantially surrounding the pipe, cable or protective tubing

3/10 • • divided, i.e. with two members engaging the pipe, cable or protective tubing

3/11 • • • and hanging from a pendant (F16L 3/14 takes precedence) **[5]**

3/12 • • comprising a member substantially surrounding the pipe, cable or protective tubing

3/123 • • • and extending along the attachment surface **[5]**

3/127 • • • and extending away from the attachment surface **[5]**

3/13 • • • and engaging it by snap action **[5]**

3/133 • • • and hanging from a pendant (F16L 3/14 takes precedence) **[5]**

3/137 • • • and consisting of a flexible band **[5]**

3/14 • Hangers in the form of bands or chains

3/16 • with special provision allowing movement of the pipe (F16L 3/01 takes precedence; supporting pipes or cables inside other pipes or sleeves F16L 7/00) **[5]**

3/18 • • allowing movement in axial direction

3/20 • • allowing movement in transverse direction

3/202 • • • the transverse movement being converted to a rotational movement (F16L 3/215 takes precedence) **[6]**

3/205 • • • having supporting springs **[5]**

3/21 • • • • providing constant supporting spring force **[5]**

3/215 • • • the movement being hydraulically or electrically controlled **[5]**

3/217 • • • • hydraulically **[6]**

3/22 • specially adapted for supporting a number of parallel pipes at intervals **[6]**

3/223 • • each support having one transverse base for supporting the pipes (F16L 3/23, F16L 3/237 take precedence) **[6]**

3/227 • • • each pipe being supported by a separate element fastened to the base **[6]**

3/23 • • for a bundle of pipes or a plurality of pipes placed side by side in contact with each other (F16L 3/237 takes precedence) **[6]**
3/233 • • • by means of a flexible band **[6]**
3/237 • • for two pipes **[6]**
3/24 • with special member for attachment to profiled girders
3/26 • specially adapted for supporting the pipes all along their length, e.g. pipe channels or ducts **[6]**

5/00 **Devices for use where pipes, cables or protective tubing pass through walls or partitions** (installations of electric cables or lines through walls, floors or ceilings H02G 3/22)
5/02 • Sealing

Note(s)

Group F16L 5/14 takes precedence over groups F16L 5/04-F16L 5/12.

5/04 • • to form a firebreak device **[6]**
5/06 • • by means of a swivel nut compressing a ring or sleeve **[6]**
5/08 • • by means of axial screws compressing a ring or sleeve **[6]**
5/10 • • by using sealing rings or sleeves only **[6]**
5/12 • • the pipe being cut in two pieces **[6]**
5/14 • • for double-walled or multi-channel pipes **[6]**

7/00 **Supporting pipes or cables inside other pipes or sleeves, e.g. for enabling pipes or cables to be inserted or withdrawn from under roads or railways without interruption of traffic** (sleeves for supporting pipes, cables or protective tubing, between relatively movable points F16L 3/01) **[5]**
7/02 • and sealing the pipes or cables inside the other pipes, cables or sleeves **[6]**

Pipes

9/00 **Rigid pipes**
9/01 • of wood (F16L 9/16-F16L 9/22 take precedence) **[6]**
9/02 • of metal (F16L 9/16-F16L 9/22 take precedence; finned pipes F28F)
9/04 • • Reinforced pipes
9/06 • • Corrugated pipes
9/08 • of concrete, cement, or asbestos cement, with or without reinforcement (F16L 9/16-F16L 9/22 take precedence)
9/10 • of glass or ceramics, e.g. clay, clay tile, porcelain (F16L 9/16-F16L 9/22 take precedence)
9/12 • of plastics with or without reinforcement (F16L 9/16-F16L 9/22 take precedence)
9/127 • • the walls consisting of a single layer **[5]**
9/128 • • • Reinforced pipes **[6]**
9/133 • • the walls consisting of two layers **[5]**
9/14 • Compound tubes, i.e. made of materials not wholly covered by any one of the preceding groups (F16L 9/16-F16L 9/22 take precedence)
9/147 • • comprising only layers of metal and plastics with or without reinforcement **[6]**
9/153 • • comprising only layers of metal and concrete with or without reinforcement **[6]**
9/16 • wound from sheets or strips, with or without reinforcement
9/17 • obtained by bending a sheet longitudinally and connecting the edges **[6]**
9/18 • Double-walled pipes; Multi-channel pipes or pipe assemblies (joints therefor F16L 39/00)
9/19 • • Multi-channel pipes or pipe assemblies **[4]**
9/21 • made of sound-absorbing materials or with sound-absorbing structure **[7]**
9/22 • Pipes composed of a plurality of segments

11/00 **Hoses, i.e. flexible pipes** (hose-like supports for pipes, cables or protective tubing, between relatively movable points F16L 3/01; suction-cleaner hoses A47L 9/24) **[5]**
11/02 • made of fibres or threads, e.g. of textile
11/04 • made of rubber or flexible plastics
11/06 • • with homogeneous wall (F16L 11/11 takes precedence) **[2]**
11/08 • • with reinforcements embedded in the wall (F16L 11/11 takes precedence) **[2]**
11/10 • • with reinforcements not embedded in the wall (F16L 11/11 takes precedence) **[2]**
11/11 • • with corrugated wall **[2]**
11/112 • • • having reinforcements embedded in the wall **[5]**
11/115 • • • having reinforcements not embedded in the wall **[5]**
11/118 • • • having arrangements for particular purposes, e.g. electrically conducting **[5]**
11/12 • • with arrangements for particular purposes, e.g. specially profiled, with protecting layer, heated, electrically conducting (F16L 11/11 takes precedence) **[2]**
11/127 • • • electrically conducting **[5]**
11/133 • • • buoyant **[5]**
11/14 • made of rigid material, e.g. metal or hard plastics
11/15 • • corrugated (F16L 11/16 takes precedence) **[5]**
11/16 • • wound from profiled strips or bands
11/18 • • Articulated hoses, e.g. composed of a series of rings
11/20 • Double-walled hoses **[5]**
11/22 • Multi-channel hoses **[5]**
11/24 • wound from strips or bands (F16L 11/16 takes precedence) **[5]**
11/26 • made of sound-absorbing materials or with sound-absorbing structure **[7]**

Pipe joints; Hose nipples [2]

13/00 **Non-disconnectable pipe joints, e.g. soldered, adhesive, or caulked joints** (joints for rigid pipes of plastics F16L 47/00)
13/007 • specially adapted for joining pipes of dissimilar materials **[5]**
13/013 • • Accessories therefor **[5]**
13/02 • Welded joints
13/04 • • with arrangements preventing overstressing
13/06 • • • with tension-relief of the weld by means of detachable members, e.g. divided tensioning rings, bolts in flanges
13/08 • Soldered joints
13/10 • Adhesive or cemented joints
13/11 • • using materials which fill the space between parts of a joint before hardening **[2]**
13/12 • with a seal made of lead, caulked packing, or the like
13/14 • made by plastically deforming the material of the pipe, e.g. by flanging, rolling
13/16 • • the pipe joint consisting of overlapping extremities having mutually co-operating collars **[5]**

15/00 **Screw-threaded joints** (casing joints used in deep-drilling E21B 17/08; joints sealed primarily by means other than engagement of screw-threads, see the relevant groups characterised by the sealing arrangements)**; Forms of screw-threads for such joints**

15/02 • allowing substantial longitudinal adjustment by the use of a long screw-threaded part

15/04 • with additional sealings **[2]**

15/06 • characterised by the shape of the screw-thread **[5]**

15/08 • with supplementary elements (F16L 15/04 takes precedence) **[5]**

17/00 **Joints with packing adapted to sealing by fluid pressure** (compensating devices F16L 51/00)

17/02 • with sealing rings arranged between outer surface of pipe and inner surface of sleeve or socket

17/025 • • the sealing rings having radially directed ribs **[5]**

17/03 • • having annular axial lips **[2]**

17/035 • • • the sealing rings having two lips parallel to each other **[5]**

17/04 • • with longitudinally split or divided sleeve

17/06 • with sealing rings arranged between the end surfaces of the pipes or flanges or arranged in recesses in the pipe ends or flanges

17/067 • • Plastics sealing rings **[6]**

17/073 • • • the sealing rings having two lips parallel to each other **[6]**

17/08 • • Metal sealing rings **[5]**

17/10 • the packing being sealed by the pressure of a fluid other than the fluid in or surrounding the pipe (expansion-compensation arrangements for pipe-lines F16L 51/00) **[5]**

19/00 **Joints in which sealing surfaces are pressed together by means of a member, e.g. a swivel nut, screwed on, or into, one of the joint parts** (F16L 17/00 takes precedence; if using bolts or equivalent connecting means F16L 23/00; connecting arrangements or other fittings specially adapted to be made of plastics or to be used with pipes made of plastics F16L 47/00)

19/02 • Pipe ends provided with collars or flanges, integral with the pipe or not, pressed together by a screwed member

19/025 • • the pipe ends having integral collars or flanges **[5]**

19/028 • • • the collars or flanges being obtained by deformation of the pipe wall **[6]**

19/03 • • with flexible sealing rings between the sealing surfaces **[2]**

19/04 • using additional rigid rings, sealing directly on at least one pipe end, which is flared either before or during the making of the connection

19/05 • • with a rigid pressure ring between the screwed member and the exterior of the flared pipe end **[5]**

19/06 • in which radial clamping is obtained by wedging action on non-deformed pipe ends

19/065 • • the wedging action being effected by means of a ring **[5]**

19/07 • • adapted for use in socket or sleeve connections **[2]**

19/075 • • specially adapted for spigot-and-socket joints **[5]**

19/08 • with metal rings which bite into the wall of the pipe

19/10 • • the profile of the ring being altered **[5]**

19/12 • • • with additional sealing means **[5]**

19/14 • • • the rings being integral with one of the connecting parts **[6]**

21/00 **Joints with sleeve or socket** (F16L 13/00, F16L 17/00, F16L 19/00 take precedence; connecting arrangements or other fittings specially adapted to be made of plastics or to be used with pipes made of plastics F16L 47/00; specially adapted for pipes of brittle material F16L 49/00)

21/02 • with elastic sealing rings between pipe and sleeve or between pipe and socket, e.g. with rolling or other prefabricated profiled rings (F16L 21/06, F16L 21/08 take precedence; if adjustability is essential F16L 27/00)

21/025 • • Rolling sealing rings **[5]**

21/03 • • placed in the socket before connection (F16L 21/025 takes precedence) **[5]**

21/035 • • placed around the spigot end before connection (F16L 21/025 takes precedence) **[5]**

21/04 • • in which sealing rings are compressed by axially-movable members

21/05 • • comprising a first ring being placed on a male part and a second ring in the sleeve or socket **[6]**

21/06 • with a divided sleeve or ring clamping around the pipe ends (flanged joints F16L 23/00; couplings of the quick-acting type F16L 37/00)

21/08 • with additional locking means (F16L 21/06 takes precedence; couplings of the quick-acting type F16L 37/00)

23/00 **Flanged joints** (F16L 13/00, F16L 17/00, F16L 19/00 take precedence; adjustable joints F16L 27/00; for hoses F16L 33/00; couplings of the quick-acting type F16L 37/00; for double-walled or multi-channel pipes, or pipe assemblies F16L 39/00; connecting arrangements or other fittings specially adapted to be made of plastics or to be used with pipes made of plastics F16L 47/00; specially adapted for pipes of brittle material F16L 49/00)

23/02 • the flanges being connected by members tensioned axially (F16L 23/12 takes precedence) **[2, 5]**

23/024 • • characterised by how the flanges are joined to, or form an extension of, the pipes **[5]**

23/026 • • • by welding **[6]**

23/028 • • • the flanges being held against a shoulder **[5]**

23/032 • • characterised by the shape or composition of the flanges **[5]**

23/036 • • characterised by the tensioning members, e.g. specially adapted bolts or C-clamps **[5]**

23/04 • the flanges being connected by members tensioned in the radial plane (F16L 23/12 takes precedence) **[2, 5]**

23/06 • • connected by toggle-action levers (quick acting couplings tightened by toggle-action levers F16L 37/20) **[5]**

23/08 • • connection by tangentially arranged pin and nut **[5]**

23/10 • • • with a pivoting or swinging pin **[5]**

23/12 • specially adapted for particular pipes **[5]**

23/14 • • for rectangular pipes **[5]**

23/16 • characterised by the sealing means **[5]**

23/18 • • the sealing means being rings **[6]**

23/20 • • • made exclusively of metal **[6]**

23/22 • • • made exclusively of a material other than metal **[6]**

23/24 • • specially adapted for unequal expansion of the parts of the joint **[6]**

25/00 **Construction or details of pipe joints not provided for in, or of interest apart from, groups F16L 13/00-F16L 23/00** (adjustable or allowing movement F16L 27/00; with fluid cut-off means F16L 29/00; quick-acting F16L 37/00; for double-walled or multi-channel pipes F16L 39/00; connecting arrangements or other fittings specially adapted to be made of plastics or to be used with pipes made of plastics F16L 47/00; specially adapted for pipes of brittle material F16L 49/00)

25/01 • specially adapted for realising electrical conduction between the two pipe ends of the joint or between parts thereof (electrically-conductive connections between or with tubular conductors H01R 4/60) **[7]**

25/02 • specially adapted for electrically insulating the two pipe ends of the joint from each other **[2]**

25/03 • • in non-disconnectable pipe joints **[7]**

25/04 • comprising a collar or ring having a threaded pin rigid with the pipe-encircling member **[5]**

25/06 • comprising radial locking means **[5]**

25/08 • • in the form of screws, nails or the like **[6]**

25/10 • Sleeveless joints between two pipes, one being introduced into the other **[7]**

25/12 • Joints for pipes being spaced apart axially **[7]**

25/14 • Joints for pipes of different diameters or cross-section **[7]**

27/00 **Adjustable joints; Joints allowing movement** (of the quick-acting type F16L 37/50; for double-walled or multi-channel pipes or pipe assemblies F16L 39/04; swivel joints in hose lines used for flushing boreholes E21B 21/02) **[5]**

27/02 • Universal joints, i.e. with mechanical connection allowing angular movement or adjustment of the axes of the parts in any direction

27/04 • • with partly-spherical engaging surfaces

27/047 • • • held in place by a screwed member having an internal spherical surface **[5]**

27/053 • • • held in place by bolts passing through flanges **[5]**

27/06 • • • with special sealing means between the engaging surfaces

27/067 • • • • the sealing means being actuated by the medium pressure **[5]**

27/073 • • • • one of the cooperating surfaces forming the sealing means **[5]**

27/08 • allowing adjustment or movement only about the axis of one pipe

27/087 • • Joints with radial fluid passages **[6]**

27/093 • • • of the "banjo" type, i.e. pivoting right-angle couplings **[6]**

27/10 • comprising a flexible connection only

27/103 • • in which a flexible element, e.g. a rubber-metal laminate, which undergoes constraints consisting of shear and flexure, is sandwiched between partly curved surfaces **[6]**

27/107 • • the ends of the pipe being interconnected by a flexible sleeve **[5]**

27/108 • • • the sleeve having the form of a bellows with only one corrugation **[6]**

27/11 • • • the sleeve having the form of a bellows with multiple corrugations **[6]**

27/111 • • • • the bellows being reinforced **[6]**

27/113 • • the ends of the pipe being interconnected by a rigid sleeve **[5]**

27/12 • allowing substantial longitudinal adjustment or movement (by use of screw-thread F16L 15/02)

29/00 **Joints with fluid cut-off means** (quick-acting joints with cut-off means F16L 37/28)

29/02 • with a cut-off device in one of the two pipe ends, the cut-off device being automatically opened when the coupling is applied **[5]**

29/04 • with a cut-off device in each of the two pipe ends, the cut-off devices being automatically opened when the coupling is applied **[5]**

31/00 **Arrangements for connecting hoses to one another or to flexible sleeves** (F16L 33/00 takes precedence)

31/02 • for branching hoses **[6]**

33/00 **Arrangements for connecting hoses to rigid members** (hand tools for inserting fittings into hoses B25B 27/10)**; Rigid hose-connectors, i.e. single members engaging both hoses** (connecting arrangements or other fittings specially adapted to be made of plastics or to be used with pipes made of plastics F16L 47/00)

Note(s)

Groups F16L 33/01 and F16L 33/26 take precedence over other subgroups

33/01 • specially adapted for hoses having a multi-layer wall **[2]**

33/02 • Hose-clips

33/025 • • tightened by deforming radially extending loops or folds **[7]**

33/03 • • Self-locking elastic clips **[7]**

33/035 • • fixed by means of teeth or hooks **[7]**

33/04 • • tightened by tangentially-arranged threaded pin and nut

33/06 • • • in which the threaded pin is rigid with the hose-encircling member

33/08 • • in which a worm coacts with a part of the hose-encircling member that is toothed like a worm-wheel

33/10 • • with a substantially-radial tightening member

33/12 • • with a pivoted or swinging tightening or securing member, e.g. toggle lever

33/14 • • with a taping-bolt, i.e. winding up the end of the hose-encircling member

33/16 • with sealing or securing means using fluid pressure

33/18 • characterised by the use of additional sealing means

33/20 • Undivided rings, sleeves, or like members contracted on the hose or expanded inside the hose by means of tools; Arrangements using such members

33/207 • • only a sleeve being contracted on the hose **[5]**

33/213 • • only a sleeve being expanded inside the hose **[5]**

33/22 • with means not mentioned in the preceding groups for gripping the hose between inner and outer parts

33/23 • • the outer parts being segmented, the segments being pressed against the hose by tangentially arranged members **[2]**

33/24 • with parts screwed directly on or into the hose (F16L 33/22 takes precedence)

33/26 • specially adapted for hoses made of metal

33/28 • for hoses with one end terminating in a radial flange or collar **[5]**

33/30 • comprising parts inside the hoses only (F16L 33/24 takes precedence) **[7]**

33/32 • comprising parts outside the hoses only (F16L 33/24 takes precedence) **[7]**

33/34 • with bonding obtained by vulcanisation, gluing, melting, or the like **[7]**

35/00 Special arrangements used in connection with end fittings of hoses, e.g. safety or protecting devices

37/00 Couplings of the quick-acting type (radially-binding sleeves F16L 17/04, F16L 21/06; connecting hoses to rigid members F16L 33/00; connections made automatically when vehicles are brought together B60D, B61G; specially adapted for lubricating devices F16N 21/00)

37/02 • in which the connection is maintained only by friction of the parts being joined (F16L 37/22 takes precedence)

37/04 • • with an elastic outer part pressing against an inner part by reason of its elasticity (with locking members F16L 37/08)

37/05 • • • tightened by the pressure of a mechanical organ **[5]**

37/06 • • • tightened by fluid pressure

37/08 • in which the connection between abutting or axially-overlapping ends is maintained by locking members (F16L 37/22-F16L 37/26 take precedence)

37/084 • • combined with automatic locking **[5]**

37/086 • • • by means of latching members pushed radially by spring-like elements **[7]**

37/088 • • • by means of a split elastic ring **[5]**

37/091 • • • by means of a ring provided with teeth or fingers **[7]**

37/092 • • • by means of elements wedged between the pipe and the frusto-conical surface of the body of the connector **[5]**

37/096 • • • by means of hooks hinged about an axis **[5]**

37/098 • • • by means of flexible hooks **[7]**

37/10 • • using a rotary external sleeve or ring on one part

37/107 • • • Bayonet-type couplings **[7]**

37/113 • • • the male part having lugs on its periphery penetrating into the corresponding slots provided in the female part **[7]**

37/12 • • using hooks, pawls, or other movable or insertable locking members (F16L 37/084 takes precedence) **[5]**

37/124 • • • using bolts, fixed to a flange, which are able to tilt in slots of another flange, and being maintained there by the tightening of nuts **[7]**

37/127 • • • using hooks hinged about an axis **[5]**

37/133 • • • using flexible hooks **[5]**

37/138 • • • using an axially movable sleeve **[7]**

37/14 • • • Joints secured by inserting between mating surfaces an element, e.g. a piece of wire, a pin, a chain

37/15 • • • • the element being a wedge **[7]**

37/16 • • • Joints tightened by the action of wedge-shaped hinged hooks

37/18 • • • Joints tightened by eccentrics or rotatable cams

37/20 • • • Joints tightened by toggle-action levers

37/22 • in which the connection is maintained by means of balls, rollers, or helical springs under radial pressure between the parts

37/23 • • by means of balls **[5]**

37/24 • in which the connection is made by inserting one member axially into the other and rotating it to a limited extent, e.g. with bayonet-action

37/244 • • the coupling being co-axial with the pipe **[5]**

37/248 • • • Bayonet-type couplings **[5]**

37/252 • • • the male part having lugs on its periphery penetrating into the corresponding slots provided in the female part **[5]**

37/256 • • the coupling not being coaxial with the pipe **[5]**

37/26 • in which the connection is made by transversely moving the parts together, with or without their subsequent rotation

37/28 • with fluid cut-off means

37/30 • • with fluid cut-off means in each of two pipe-end fittings **[5]**

37/32 • • • at least one of two lift valves being opened automatically when the coupling is applied **[5]**

37/33 • • • • the lift valves being of the ball type **[7]**

37/34 • • • • at least one of the lift valves being of the sleeve type, i.e. a sleeve being telescoped over an inner cylindrical wall **[5]**

37/35 • • • • at least one of the valves having an axial bore communicating with lateral apertures **[7]**

37/36 • • • with two lift valves being actuated to initiate the flow through the coupling after the two coupling parts are locked against withdrawal **[5]**

37/367 • • • with two gate valves or sliding valves **[7]**

37/373 • • • with two taps or cocks **[7]**

37/38 • • with fluid cut-off means in only one of two pipe-end fittings **[5]**

37/40 • • • with a lift valve being opened automatically when the coupling is applied **[5]**

37/407 • • • • the lift valve being of the ball type **[7]**

37/413 • • • • the lift valve being of the sleeve type, i.e. a sleeve being telescoped over an inner cylindrical wall **[7]**

37/42 • • • • the valve having an axial bore communicating with lateral apertures **[5]**

37/44 • • • with one lift valve being actuated to initiate the flow through the coupling after the two coupling parts are locked against withdrawal **[5]**

37/46 • • • with a gate valve or sliding valve **[5]**

37/47 • • • with a tap or cock **[7]**

37/48 • for fastening a pipe on the end of a tap **[5]**

37/50 • adjustable; allowing movement of the parts joined **[5]**

37/52 • • Universal joints, i.e. with a mechanical connection allowing angular movement or adjustment of the axes of the parts in any direction **[5]**

37/53 • • allowing adjustment or movement only about the axis of one pipe **[7]**

37/54 • • for pipes under pressure which are supported only on one side **[5]**

37/56 • for double-walled or multi-channel pipes **[5]**

37/58 • the extremities of the two halves of the joint being pressed against each other without being locked in position **[5]**

37/60 • with plug and fixed wall housing **[7]**

37/62 • pneumatically or hydraulically actuated **[7]**

39/00 Joints or fittings for double-walled or multi-channel pipes or pipe assemblies

39/02 • for hoses

39/04 • allowing adjustment or movement

39/06 • of the multiline swivel type, e.g. comprising a plurality of axially mounted modules **[7]**

41/00 Branching pipes; Joining pipes to walls (F16L 39/00 takes precedence; connections not designed for conveying fluid F16B 9/00; joints suitable for connecting together pipe ends, see the relevant groups)

41/02 • Branch units, e.g. made in one piece, welded, riveted

41/03 • • comprising junction pieces for four or more pipe members **[5]**

41/04 • Tapping pipe walls, i.e. making connections through the walls of pipes while they are carrying fluids; Fittings therefor (apparatus or operations relating to metal-working steps, see the relevant classes for metal-working)
41/06 • • making use of attaching means embracing the pipe
41/08 • Joining pipes to walls or pipes, the joined pipe axis being perpendicular to the plane of a wall or to the axis of another pipe (F16L 41/02 takes precedence) **[2]**
41/10 • • the extremity of the pipe being screwed into the wall **[5]**
41/12 • • using attaching means embracing the pipe **[5]**
41/14 • • by screwing an intermediate part against the inside or outside of the wall **[5]**
41/16 • • the branch pipe comprising fluid cut-off means **[5]**
41/18 • the branch pipe being movable **[7]**

43/00 Bends; Siphons (with cleaning apertures F16L 45/00; siphons for water-closets E03D 11/18; siphons in general F04F 10/00)
43/02 • adapted to make use of special securing means

45/00 Pipe units with cleaning aperture and closure therefor

47/00 Connecting arrangements or other fittings specially adapted to be made of plastics or to be used with pipes made of plastics (packing, for joints, adapted to sealing by fluid pressure F16L 17/00)
47/02 • Welded joints; Adhesive joints
47/03 • • Welded joints with an electrical resistance incorporated in the joint **[7]**
47/04 • with a swivel nut or collar engaging the pipe **[2]**
47/06 • with sleeve or socket formed by or in the pipe end **[2]**
47/08 • • with sealing rings arranged between the outer surface of one pipe end and the inner surface of the sleeve or socket, the sealing rings being placed previously in the sleeve or socket **[7]**
47/10 • • • the sealing rings being maintained in place by additional means **[7]**
47/12 • • with additional locking means **[7]**
47/14 • Flanged joints **[7]**
47/16 • Screw-threaded joints **[7]**
47/18 • Adjustable joints; Joints allowing movement **[7]**
47/20 • based principally on specific properties of plastics **[7]**
47/22 • • using shrink-down material **[7]**
47/24 • • for joints between metal and plastics pipes **[7]**
47/26 • for branching pipes; for joining pipes to walls; Adaptors therefor **[7]**
47/28 • • Joining pipes to walls or to other pipes, the axis of the joined pipe being perpendicular to the wall or to the axis of the other pipe **[7]**
47/30 • • • using attaching means embracing the pipe **[7]**
47/32 • • Branch units, e.g. made in one piece, welded, riveted **[7]**
47/34 • • Tapping pipes, i.e. making connections through walls of pipes while carrying fluids; Fittings therefor **[7]**

49/00 Connecting arrangements, e.g. joints, specially adapted for pipes of brittle material, e.g. glass, earthenware
49/02 • Joints with a sleeve or socket **[5]**
49/04 • Flanged joints **[5]**
49/06 • Joints in which sealing surfaces are pressed together by means of a member, e.g. swivel nut, screwed on, or into, one of the joint parts **[7]**
49/08 • Adjustable joints; Joints allowing movement **[7]**

51/00 Expansion-compensation arrangements for pipe-lines (telescopic pipes F16L 27/12)
51/02 • making use of a bellows or an expansible folded or corrugated tube
51/03 • • comprising two or more bellows **[5]**
51/04 • making use of bends, e.g. lyre-shaped

53/00 Heating or cooling pipes or pipe systems (preventing freezing of pipes, thawing frozen pipes E03B 7/12, E03B 7/14; pipe-line systems, pipe-lines F17D)

55/00 Devices or appurtenances for use in, or in connection with, pipes or pipe systems (F16L 1/00-F16L 53/00, F16L 57/00, F16L 59/00 take precedence; repairing or joining pipes on or under water F16L 1/26; nozzles B05B; cleaning of pipes B08B 9/02, e.g. removal of blockages B08B 9/027; devices for preventing bursting of water pipes by freezing E03B 7/10; for domestic plumbing installations E03C 1/00; arrangements for sealing leaky tubes or conduits of heat-exchangers F28F 11/00)
55/02 • Energy absorbers; Noise absorbers (in valves F16K 47/00)
55/027 • • Throttle passages (influencing fluid flow F15D 1/00; control of fluid flow G05D 7/00) **[5]**
55/033 • • Noise absorbers (F16L 55/027 takes precedence) **[5]**
55/035 • • • in the form of specially adapted hangers or supports **[7]**
55/04 • Devices damping pulsations or vibrations in fluids
55/045 • • specially adapted to prevent or minimise the effects of water hammer **[5]**
55/05 • • • Buffers therefor (accumulators F15B 1/04) **[5]**
55/052 • • • • Pneumatic reservoirs **[7]**
55/053 • • • • • the gas in the reservoir being separated from the fluid in the pipe **[7]**
55/054 • • • • • • the reservoir being placed in or around the pipe from which it is separated by a sleeve-shaped membrane **[7]**
55/055 • • • Valves therefor **[5]**
55/07 • Arrangement or mounting of devices, e.g. valves, for venting or aerating or draining (arrangement of draining devices in water-supply systems E03B 7/08; apparatus for draining F16K, F16T; venting or aerating devices per se F16K 24/00) **[2]**
55/09 • Air-conditioning, e.g. de-watering, in pneumatic systems (in general F24)
55/10 • Means for stopping flow in pipes or hoses (F16L 29/00, F16L 37/28 take precedence; for covering leaks F16L 55/16; valves F16K) **[1, 7]**
55/103 • • by temporarily freezing liquid sections in the pipe **[7]**
55/105 • • Closing devices introduced radially into the pipe or hose **[5]**
55/11 • • Plugs **[5]**
55/115 • • Caps **[5]**
55/12 • • by introducing into the pipe a member expandable in situ (inflatable cut-off valves F16K 7/10)
55/124 • • • introduced radially into the pipe or hose **[5]**
55/128 • • • introduced axially into the pipe or hose **[5]**

55/13 • • • • the closure device being a plug fixed by plastic deformation **[7]**

55/132 • • • • the closure device being a plug fixed by radially deforming the packing **[5]**

55/134 • • • • • by means of an inflatable packing **[7]**

55/136 • • • • the closure device being a plug fixed by radially expanding or deforming a split ring, hooks or the like **[5]**

55/16 • Devices for covering leaks in pipes or hoses, e.g. hose-menders **[1, 7]**

55/162 • • from inside the pipe (specially adapted for bends, branch units, branching pipes, or the like F16L 55/179) **[5, 7]**

55/163 • • • a ring, a band or a sleeve being pressed against the inner surface of the pipe **[7]**

55/164 • • • a sealing fluid being introduced in the pipe (F16L 55/1645 takes precedence) **[7]**

55/1645 • • • a sealing material being introduced inside the pipe by means of a tool moving in the pipe **[7]**

55/165 • • • a pipe being inserted in the damaged section **[5, 7]**

55/168 • • from outside the pipe (specially adapted for bends, branch units, branching pipes, or the like F16L 55/179) **[5, 7]**

55/17 • • • by means of rings, bands or sleeves pressed against the outside surface of the pipe or hose (hose-clips for connecting hoses to rigid members F16L 33/02) **[5, 7]**

55/172 • • • • the ring, band or sleeve being tightened by a tangentially arranged threaded pin and a nut **[5, 7]**

55/175 • • • by using materials which fill a space around the pipe before hardening **[5, 7]**

55/178 • • • by clamping an outer gasket against a joint with sleeve or socket **[5, 7]**

55/179 • • specially adapted for bends, branch units, branching pipes or the like **[7]**

55/18 • Appliances for use in repairing pipes (F16L 55/10 takes precedence)

55/24 • Preventing accumulation of dirt or other matter in pipes, e.g. by traps, by strainers

55/26 • Pigs or moles, i.e. devices movable in a pipe or conduit with or without self-contained propulsion means (tunnel railway systems B61B 13/10; conveying articles through pipes or tubes, e.g. tube mail systems, B65G 51/00) **[5]**

Note(s)

1. Pigs or moles specially adapted for particular applications are classified in the relevant places for the applications, e.g.
   - stopping flow from or in pipes or hoses F16L 55/12;
   - repairing pipes F16L 55/18;
   - applying liquids or other fluent materials to the inside of tubes B05C 7/08;
   - cleaning pipes or tubes or systems of pipes or tubes B08B 9/02;
   - welding or cutting B23K 37/02;
   - earth drilling E21B;
   - cleaning chimneys F23J 3/02;
   - cleaning internal or external surfaces of heat-exchange or heat-transfer conduits F28G;
   - measuring, testing G01;
   - inspection of vessels in nuclear reactors G21C 17/003;
   - inspection or maintenance of pipe-lines or tubes in nuclear installations G21C 17/017;
   - installing electric, or combined optical and electric, cables or lines H02G.
2. In this group, it is desirable to add the indexing codes of group F16L 101/00.

55/28 • • Constructional aspects **[6]**

55/30 • • • of the propulsion means, e.g. towed by cables **[6]**

55/32 • • • • being self-contained **[6]**

55/34 • • • • • the pig or mole being moved step by step **[6]**

55/36 • • • • • jet driven **[6]**

55/38 • • • • driven by fluid pressure **[6]**

55/40 • • • of the body **[6]**

55/42 • • • • gelled or degradable **[6]**

55/44 • • • • expandable **[6]**

55/46 • • Launching or retrieval of pigs or moles **[6]**

55/48 • • Indicating the position of the pig or mole in the pipe or conduit **[6]**

57/00 Protection of pipes or objects of similar shape against external or internal damage or wear (supporting of pipes inside other pipes or sleeves F16L 7/00; used in connection with end fittings of hoses F16L 35/00; protection of pipes or pipe fittings against corrosion or incrustation F16L 58/00; protection thereof during transport B65D, e.g. B65D 59/00)

57/02 • against cracking or buckling **[7]**

57/04 • against fire or other external sources of extreme heat **[7]**

57/06 • against wear (F16L 57/04 takes precedence) **[7]**

58/00 Protection of pipes or pipe fittings against corrosion or incrustation (supporting of pipes inside other pipes or sleeves F16L 7/00; compound tubes F16L 9/14; cleaning pipes or tubes B08B 9/02)

58/02 • by means of internal or external coatings (coatings for thermal insulation F16L 59/00; methods or machines for applying coatings, see the relevant places, e.g. B28B 21/94) **[2]**

58/04 • • Coatings characterised by the materials used (F16L 58/16 takes precedence; compositions, see the relevant classes, e.g. C04B) **[2]**

58/06 • • • by cement, concrete, or the like **[2]**

58/08 • • • by metal **[2]**

58/10 • • • by rubber or plastics **[2]**

58/12 • • • by tar or bitumen **[2]**

58/14 • • • by ceramic or vitreous materials **[2]**

58/16 • • the coating being in the form of a bandage (apparatus for covering cores by winding B65H 81/00) **[2]**

58/18 • specially adapted for pipe fittings **[2]**

59/00 Thermal insulation in general (heat, sound insulation in buildings E04B; heat insulation of steam engines F01B 31/08; heat insulation in rotary piston machines or engines F01C 21/06; heat insulation of pumps F04C 29/04; thermal insulation of pressure vessels F17C 1/12; vessels not under pressure, with provision for insulation F17C 3/02)

59/02 • Shape or form of insulating materials, with or without coverings integral with the insulating materials (chemical aspects, see the relevant classes)

59/04 • Arrangements using dry fillers, e.g. using slag wool

59/05 • • in prefabricated shells or covers **[2]**

59/06 • Arrangements using an air layer or vacuum

59/065 • • using vacuum (F16L 59/075 takes precedence) **[7]**
59/07 • • the air layer being enclosed by one or more layers of insulation **[7]**
59/075 • • the air layer or the vacuum being delimited by longitudinal channels distributed around the circumference of a tube **[7]**
59/08 • Means for preventing radiation, e.g. with metal foil
59/10 • Bandages or covers for the protection of the insulation, e.g. against the influence of the environment or against mechanical damage (integral with insulating materials F16L 59/02)
59/11 • • Rigid covers for elbows **[7]**
59/12 • Arrangements for supporting insulation from the wall or body insulated, e.g. by means of spacers between pipe and heat-insulating material; Arrangements specially adapted for supporting insulated bodies
59/125 • • Helical spacers **[7]**
59/13 • • Resilient supports **[7]**
59/135 • • Hangers or supports specially adapted for insulated pipes **[7]**
59/14 • Arrangements for the insulation of pipes or pipe systems (F16L 59/02-F16L 59/12 take precedence)
59/147 • • the insulation being located inwardly of the outer surface of the pipe **[5]**
59/15 • • for underground pipes **[7]**
59/153 • • for flexible pipes **[5]**
59/16 • • Arrangements specially adapted to local requirements at flanges, junctions, valves, or the like (means in or on valves for heating or cooling F16K 49/00)
59/18 • • • adapted for joints **[5]**
59/20 • • • • for non-disconnectable joints **[5]**
59/21 • • • adapted for expansion-compensation devices **[7]**
59/22 • • • adapted for bends **[5]**

Indexing scheme associated with groups F16L 55/26-F16L 55/48, relating to uses and applications of pigs or moles. [6]

101/00 Uses or applications of pigs or moles [6]

101/10 • Treating the inside of pipes **[6]**
101/12 • • Cleaning **[6]**
101/14 • • Drying **[6]**
101/16 • • Coating by application of fluent materials, e.g. painting **[6]**
101/18 • • Lining other than coating **[6]**
101/20 • Expelling gases or fluids **[6]**
101/30 • Inspecting, measuring or testing **[6]**
101/40 • Separating transported fluids **[6]**
101/50 • Pulling cables or the like **[6]**
101/60 • Stopping leaks **[6]**
101/70 • Drill-well operations **[6]**

F16M FRAMES, CASINGS, OR BEDS, OF ENGINES OR OTHER MACHINES OR APPARATUS, NOT SPECIFIC TO AN ENGINE, MACHINE, OR APPARATUS PROVIDED FOR ELSEWHERE; STANDS OR SUPPORTS

Note(s)

Attention is drawn to the following places:
B21B 31/02.....Metal-rolling stand frames
G01D 11/30.....Supports specially adapted for indicating or recording instruments.

Subclass index

1/00 Frames or casings of engines, machines, or apparatus; Frames serving as machinery beds [2]
1/02 • for reciprocating engines or similar machines
1/021 • • for housing crankshafts
1/022 • • • of tunnel type, i.e. wherein the crankshaft can only be introduced axially (for engines or machines with star-shaped cylinder arrangement F16M 1/023)
1/023 • • • specially adapted for engines or machines with star-shaped cylinder arrangement
1/024 • • • facilitating assembly of power-transmitting parts of engines or machines, e.g. of connecting-rods
1/025 • • • Assembling bearings in casings, e.g. having anchor bolts
1/026 • • for housing movable engine or machine parts other than crankshafts, e.g. valve-gear housings
1/04 • for rotary engines or similar machines
1/08 • characterised by being built-up of sheet material or welded parts

3/00 Portable or wheeled frames or beds, e.g. for emergency power-supply aggregates, compressor sets (construction of vehicles in general B60-B62)

5/00 Engine beds, i.e. means for supporting engines or machines on foundations

7/00 **Details of attaching or adjusting engine beds, frames, or supporting-legs on foundation or base; Attaching non-moving engine parts, e.g. cylinder blocks** (elastic or equivalent mounting for absorbing vibrations F16F, especially F16F 15/04)

9/00 **Special layout of foundations with respect to machinery to be supported** (foundations for machinery E02D 27/44)

11/00 **Stands or trestles as supports for apparatus or articles placed thereon** (without heads F16M 13/00; easels or stands for blackboards or the like A47B 97/04; show-stands A47F 7/00; for workmen E04G 1/32; supporting, suspending for lighting devices F21V 21/00; special modifications for particular apparatus or articles, see the appropriate subclasses)

11/02 • Heads

11/04 • • Means for attachment of apparatus; Means allowing adjustment of the apparatus relatively to the stand

11/06 • • • allowing pivoting

11/08 • • • • around a vertical axis

11/10 • • • • around a horizontal axis

11/12 • • • • in more than one direction

11/14 • • • • • with ball-joint (ball-jointed hinges F16C 11/06)

11/16 • • Details concerning attachment of head-supporting legs, with or without actuation of locking members therefor

11/18 • • with mechanism for moving the apparatus relatively to the stand

11/20 • Undercarriages with or without wheels

11/22 • • with approximately constant height, e.g. with constant length of column or of legs (F16M 11/42 takes precedence)

11/24 • • changeable in height or length of legs, also for transport only (F16M 11/42 takes precedence)

11/26 • • • by telescoping, with or without folding (details concerning the constructional features of telescoping parts only F16B 7/10)

11/28 • • • • Undercarriages for supports with one single telescoping pillar

11/30 • • • • • with co-moving side-struts

11/32 • • • • Undercarriages for supports with three or more telescoping legs

11/34 • • • • • Members limiting spreading of legs

11/36 • • • • • Members preventing slipping of the feet

11/38 • • • by folding

11/40 • • • by means of coilable or bendable legs

11/42 • with arrangement for propelling the support

13/00 **Other supports for positioning apparatus or articles** (heads thereof F16M 11/02; adapted to be stuck in the ground A45F 3/44)**; Means for steadying hand-held apparatus or articles**

13/02 • for supporting on, or attaching to, an object, e.g. tree, gate, window-frame, cycle

13/04 • for supporting on, or holding steady relative to, a person, e.g. by chains

13/06 • also serviceable for other purposes, e.g. to be used as spade, chair, ski-stick

13/08 • • for use as a walking-cane

F16N LUBRICATING

Note(s)

Attention is drawn to the following places, which cover lubrication of specific apparatus or in particular processes:

A01D 69/12.....Harvesters
B21B 25/04.....Mandrels for metal tube rolling mills
B21B 27/06.....Rolls for metal rolling mills
B21D 37/18.....Tools for machines for working metal without removing material
B21J 3/00.....Forging or pressing
B22D 11/07.....Moulds for continuous casting of metals
B23C 5/28.....Milling cutters
B23D 59/02, B23D 59/04.....Metal saws
B23Q 11/10, B23Q 11/12.....Machine tools
B25D 17/26.....Portable power-driven percussive tools
B26B 19/40.....Hair-clippers or dry-shavers
B27B 13/12.....Band saw blades for wood or the like
B60R 17/00.....Vehicles
B61B 12/08.....Cable systems for railways
B61C 17/08.....Railway locomotives
B61F 17/00.....Axle-boxes of rail vehicles
B61K 3/00.....Rail or wheel flanges of railways
B62D 55/092.....Endless-track units for vehicles
B62J 31/00.....Cycles
B65G 45/02.....Conveyers
B66B 7/12.....Ropes, cables or guides of elevators
D01H 7/20.....Spindles of machines for spinning or twisting threads or fibres
D04B 35/28.....Knitting machines
D05B 71/00.....Sewing machines
D05C 13/04.....Embroidering machines
E01B 7/26.....Switches for railways
E05B 17/08.....Locks
E05D 11/02.....Hinges
E21B 10/22.....Roller bits for earth drilling

F01C 21/04.....Rotary-piston or oscillating-piston machines or engines
F01D 25/18.....Non-positive-displacement machines
F01M.....Machines or engines in general
F02C 7/06.....Gas-turbine plants
F02F 1/20.....Cylinders of combustion engines
F04B 39/02.....Pumps for liquids
F04C 29/02.....Rotary-piston or oscillating-piston pumps for liquids
F04D 29/04.....Non-positive-displacement pumps
F16C 1/24.....Flexible shafts
F16C 33/10.....Sliding-contact bearings
F16C 33/66.....Ball or roller bearings
F16F 1/24.....Springs
F16H 57/04.....Transmissions
F41A 29/04.....Smallarms or ordnance
G04B 31/08.....Clocks
H01R 39/56.....Rotary current collectors, distributors or interrupters

Subclass index

Lubrication devices or arrangements for oil or grease

1/00 Constructional modifications of parts of machines or apparatus for the purpose of lubrication

3/00 Devices for supplying lubricant by manual action
3/02 • delivering oil
3/04 • • Oil cans; Oil syringes
3/06 • • • delivering on squeezing
3/08 • • • incorporating a piston-pump
3/10 • delivering grease
3/12 • • Grease guns

5/00 Apparatus with hand-positioned nozzle supplied with lubricant under pressure (F16N 3/00 takes precedence)
5/02 • Nozzles or nozzle-valve arrangements therefor, e.g. high-pressure grease guns

7/00 Arrangements for supplying oil or unspecified lubricant from a stationary reservoir or the equivalent in or on the machine or member to be lubricated
7/02 • with gravity feed or drip lubrication
7/04 • • with oil flow promoted by vibration
7/06 • • Arrangements in which the droplets are visible
7/08 • • controlled by means of the temperature of the member to be lubricated
7/10 • • incorporating manually-operated regulating means, e.g. spindles
7/12 • with feed by capillary action, e.g. by wicks
7/14 • the lubricant being conveyed from the reservoir by mechanical means (by pumping devices F16N 7/36, F16N 7/38)
7/16 • • the oil being carried up by a lifting device
7/18 • • • with one or more feed members fixed on a shaft
7/20 • • • with one or more members moving around the shaft to be lubricated
7/22 • • • • shaped as rings
7/24 • • • with discs, rollers, belts, or the like contacting the shaft to be lubricated
7/26 • • Splash lubrication
7/28 • • Dip lubrication
7/30 • the oil being fed or carried along by another fluid
7/32 • • Mist lubrication
7/34 • • • Atomising devices for oil
7/36 • with feed by pumping action of the member to be lubricated or of a shaft of the machine; Centrifugal lubrication
7/38 • with a separate pump; Central lubrication systems
7/40 • • in a closed circulation system

9/00 Arrangements for supplying oil or unspecified lubricant from a moving reservoir or the equivalent (also usable with a stationary reservoir F16N 7/00)
9/02 • with reservoir on or in a rotary member
9/04 • with reservoir on or in a reciprocating, rocking, or swinging member

11/00 Arrangements for supplying grease from a stationary reservoir or the equivalent in or on the machine or member to be lubricated; Grease cups
11/02 • Hand-actuated grease cups, e.g. Stauffer cups
11/04 • Spring-loaded devices
11/06 • Weight-loaded devices
11/08 • with mechanical drive, other than directly by springs or weights (lubricating-pumps F16N 13/00)
11/10 • by pressure of another fluid
11/12 • by centrifugal action

13/00 Lubricating-pumps (oil cans with pump F16N 3/08)

13/02 • with reciprocating piston (pumps with distributing equipment F16N 13/22)
13/04 • • Adjustable reciprocating pumps
13/06 • • Actuation of lubricating-pumps
13/08 • • • by hand
13/10 • • • with mechanical drive (F16N 13/18 takes precedence)
13/12 • • • • with ratchet
13/14 • • • • with cam or wobble-plate on shaft parallel to the pump cylinder or cylinders
13/16 • • • with fluid drive
13/18 • • • relative movement of pump parts being produced by inertia of one of the parts or of a driving member
13/20 • Rotary pumps (with distributing equipment F16N 13/22)
13/22 • with distributing equipment

15/00 Lubrication with substances other than oil or grease; Lubrication characterised by the use of particular lubricants in particular apparatus or conditions (F16N 17/00 takes precedence; lubricating compositions, selection of particular substances as lubricants in general C10M; lubrication specially adapted to machines or apparatus provided for in a single other class, see the relevant class for the machine or apparatus)
15/02 • with graphite or graphite-containing compositions
15/04 • with water

17/00 Lubrication of machines or apparatus working under extreme conditions (additives to lubricating oil or lubricating grease C10M)
17/02 • at high temperature
17/04 • at low temperature
17/06 • in vacuum or under reduced pressure (of rotary anodes of X-ray tubes H01J 35/10)

Details of lubricators or lubrication systems

19/00 Lubricant containers for use in lubricators or lubrication systems

21/00 Conduits; Junctions; Fittings for lubrication apertures
21/02 • Lubricating nipples
21/04 • Nozzles for connection of lubricating equipment to nipples
21/06 • Covering members for nipples, conduits, or apertures

23/00 Special adaptations of check valves

25/00 Distributing equipment (combined with oil pump F16N 13/22)
25/02 • with reciprocating distributing slide valve
25/04 • with rotary distributing member

27/00 Proportioning devices
27/02 • Gating equipment

29/00 Special means in lubricating arrangements or systems providing for the indication or detection of undesired conditions; Use of devices responsive to conditions in lubricating arrangements or systems (constructions of apparatus outside the lubricating arrangements or systems, see the relevant classes)
29/02 • for influencing the supply of lubricant
29/04 • enabling a warning to be given; enabling moving parts to be stopped

31/00 Means for collecting, retaining, or draining-off lubricant in or on machines or apparatus
31/02 • Oil catchers; Oil wipers (oil-scraping rings for pistons F16J 9/20)

33/00 Mechanical arrangements for cleaning lubricating equipment; Special racks or the like for use in draining lubricant from machine parts

Care of lubricants

35/00 Storage of lubricants in engine-rooms or the like

37/00 Equipment for transferring lubricant from one container to another
37/02 • for filling grease guns

39/00 Arrangements for conditioning of lubricants in the lubricating system (cleaning of lubricating oil, lubricating compositions C10M)
39/02 • by cooling
39/04 • by heating
39/06 • by filtration
39/08 • by diluting, e.g. by addition of fuel

99/00 Subject matter not provided for in other groups of this subclass [2006.01]

F16P SAFETY DEVICES IN GENERAL

Note(s)

Attention is drawn to the following places:

A01D 75/18, A01D 75/20.....Harvesters or mowers
A01F 21/00.....Threshing machines or baling presses
B02C 23/04.....Crushing or disintegrating machines
B21B 33/00.....Rolling of metal
B21D 55/00.....Working sheet metal or tubes, rods or profiles without essentially removing material
B23B 25/04.....Turning-machines
B23Q 11/00.....Machine tools
B24B 55/00.....Grinding or polishing machines
B25D 17/10.....Portable power-driven percussive tools
B25J 19/06.....Manipulators

B26D 7/22.....Cutting machines
B27G 19/00.....Wood saws
B65B 57/00.....Packaging machines or apparatus
B65G 43/00.....Conveyers
B65H 26/00.....Web-advancing mechanisms
B65H 63/00.....Handling or winding of thin or filamentary material
D01G 31/00.....Treatment of fibres
D01H 13/14.....Spinning or twisting
D05B 83/00.....Sewing machines
F21V 25/00.....Lighting devices.

Devices protecting or preventing injuries to people

1/00 **Safety devices independent of the control or operation of any machine** (protective devices for the eyes or ears, worn on the body or carried in the hand, A61F 9/00, A61F 11/00)
1/02 • Fixed screens or hoods
1/04 • Screens or hoods rotating with rotary shafts
1/06 • specially designed for welding

3/00 **Safety devices acting in conjunction with the control or operation of a machine; Control arrangements requiring the simultaneous use of two or more parts of the body** (F16P 5/00 takes precedence)
3/02 • Screens or other safety members moving in synchronism with members which move to and fro
3/04 • • for machines with parts which approach one another during operation, e.g. for stamping presses
3/06 • • • in which body parts of the operator are removed from the danger zone on approach of the machine parts
3/08 • in connection with the locking of doors, covers, guards, or like members giving access to moving machine parts
3/10 • • in which the operation of locking the door or other member causes the machine to start
3/12 • with means, e.g. feelers, which in case of the presence of a body part of a person in or near the danger zone influence the control or operation of the machine (F16P 3/08 takes precedence)
3/14 • • the means being photocells or other devices sensitive without mechanical contact
3/16 • • with feeling members moved by the machine
3/18 • Control arrangements requiring the use of both hands
3/20 • • for electric control systems
3/22 • • for hydraulic or pneumatic control systems
3/24 • • for mechanical controls

5/00 **Emergency means for rendering ineffective a coupling conveying reciprocating movement if the motion of the driven part is prematurely resisted**

7/00 **Emergency devices preventing damage to a machine or apparatus** (F16P 1/00, F16P 3/00, F16P 5/00 take precedence; indicating means, see the appropriate classes)
7/02 • by causing the machine to stop on the occurrence of dangerous conditions therein (devices in bearings affected by abnormal conditions F16C)

F16S CONSTRUCTIONAL ELEMENTS IN GENERAL; STRUCTURES BUILT-UP FROM SUCH ELEMENTS, IN GENERAL

Note(s)

This subclass does not cover similar elements and structures, restricted to use in the building art, which are covered by subclass E04C.

1/00 **Sheets, panels, or other members of similar proportions; Constructions comprising assemblies of such members** (built-up gratings F16S 3/00; layered products B32B)

Note(s)

In this group, the members may be generally flat or curved, but they may depart from such shape in detail over part or all of their area, e.g. they may be corrugated, ribbed, flanged; ribs, flanges, or the like may be separately formed.

1/02 • designed for being secured together edge to edge, e.g. at an angle; Assemblies thereof
1/04 • produced by deforming or otherwise working a flat sheet (honeycomb or other core members for layered products B32B 3/00, e.g. B32B 3/12, B32B 3/24, B32B 3/26)
1/06 • • by deforming only
1/08 • • by cutting or perforating, with or without deformation
1/10 • Composite members, e.g. with ribs or flanges attached (F16S 1/02 takes precedence)
1/12 • of substantial thickness, e.g. with varying thickness, with channels
1/14 • Assemblies of such members with members of forms covered by group F16S 3/00 or F16S 5/00 (such other members being for jointing only F16S 1/02)

3/00 **Elongated members, e.g. profiled members; Assemblies thereof; Gratings or grilles** (gratings or grilles formed from a sheet or the like F16S 1/00, particularly F16S 1/08; frames for doors, windows or the like E06B 1/00, E06B 3/00)
3/02 • composed of two or more elongated members secured together side by side
3/04 • designed for being joined to similar members in various relative positions
3/06 • Assemblies of elongated members (F16S 3/02, F16S 3/04 take precedence)
3/08 • • forming frameworks, e.g. gratings

5/00 **Other constructional members not restricted to an application fully provided for in a single class**

F16T STEAM TRAPS OR LIKE APPARATUS FOR DRAINING-OFF LIQUIDS FROM ENCLOSURES PREDOMINANTLY CONTAINING GASES OR VAPOURS

1/00 Steam traps or like apparatus for draining-off liquids from enclosures predominantly containing gases or vapours, e.g. gas lines, steam lines, containers

1/02 • with valves controlled thermally
1/04 • • by expansion rods
1/06 • • by expansion tubes
1/08 • • by bimetallic strips or plates
1/10 • • by thermally-expansible liquids
1/12 • with valves controlled by excess or release of pressure
1/14 • • involving a piston, diaphragm, or bellows, e.g. displaceable under pressure of incoming condensate
1/16 • • involving a high-pressure chamber and a low-pressure chamber communicating with one another, i.e. thermodynamic steam chambers
1/18 • • involving a vacuum chamber
1/20 • with valves controlled by floats
1/22 • • of closed-hollow-body type
1/24 • • • using levers
1/26 • • of upright-open-bucket type
1/28 • • • using levers
1/30 • • of inverted-open-bucket type; of bell type
1/32 • • of rocking or tilting type
1/34 • without moving parts other than hand valves, e.g. labyrinth type
1/36 • specially adapted for steam lines of low pressure
1/38 • Component parts; Accessories
1/40 • • Actuating mechanisms of ball valves
1/42 • • Actuating mechanisms of slide valves
1/45 • • Means for venting or aerating (separate devices therefor F16K 24/00) **[2]**
1/48 • • Monitoring arrangements for inspecting, e.g. flow of steam and steam condensate