

CPC COOPERATIVE PATENT CLASSIFICATION

F MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING (NOTE omitted)

ENGINEERING IN GENERAL

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

F16C SHAFTS; FLEXIBLE SHAFTS; ELEMENTS OR CRANKSHAFT MECHANISMS; ROTARY BODIES OTHER THAN GEARING ELEMENTS; BEARINGS

NOTES

1. In this subclass the following expression is used with the meaning indicated:
 - "rotary bodies other than gearing elements" covers any element which rotates so far as its features are affected only by the fact that it rotates.
2. Attention is drawn to the following places:

A01B 71/04 B21B 31/07 B61C 17/10 B61F 15/00 B62K 21/06 E06B 9/174, E06B 9/50 E21B 10/22 F01C 21/02 F01D 25/16 F02C 7/06 G01C 19/16 G01D 11/02 G01G 21/02 G01R 1/10 G01R 11/12 G02C 5/22 G04B 31/00 H02N 15/00	Bearings for agricultural machines Adaptation of roll bearings for metal-rolling mills Connecting-rods, bearings for driving wheels of railway locomotives Axle-boxes for railway vehicles Bearings for steering heads Bearings specially adapted for roller shutters or for roller blinds Bearings for drill bits Arrangement of bearings in rotary-piston machines or engines Arrangement of bearings in non-positive displacement machines or engines Arrangement of bearings in gas-turbine plants Bearings for gyroscopes Bearings or suspensions for moving parts of measuring instruments Arrangements of bearings in weighing apparatus Arrangements of bearings in instruments for measuring electric variables Arrangements of bearings for apparatus for measuring time integral of electric power or current Hinges for spectacles Bearings for clockwork Magnetic levitation devices.
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WARNING

In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

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) 1/101 . . {Intermediate connectors for joining portions of split flexible shafts and/or sheathings} 1/102 . . {Arrangements to mount end fittings of the sheathings to support walls or brackets} 1/103 . . . {to a hole in the wall or bracket} 1/105 . . . {to a slot in the bracket}	1/106 . . {Plurality of transmitting means, e.g. two or more parallel "Bowden cables"} 1/107 . . {Sealing details} 1/108 . . {Reducing or controlling of vibrations, e.g. by resilient damping of noise} 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 1/145 {Attachment of the end-piece 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
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- 1/20 . . Construction of flexible members moved to and fro in the sheathing
- 1/205 . . . {Details of the outer surface of the flexible member, e.g. coatings}
- 1/22 . . Adjusting; Compensating length
- 1/223 . . . {by adjusting the effective length of the flexible member}
- 1/226 . . . {by adjusting the effective length of the sheathing}
- 1/24 . Lubrication; Lubricating equipment
- 1/26 . Construction of guiding-sheathings or guiding-tubes
- 1/262 . . {End fittings; Attachment thereof to the sheathing or tube}
- 1/265 . . . {with a swivel tube connected to the end-fitting of a sheathing, e.g. with a spherical joint}
- 1/267 . . {Details of the inner surface of the sheathing or tube, e.g. coatings}
- 1/28 . . with built in bearings {, e.g. sheathing with rolling elements between the sheathing and the core element}
- 3/00 Shafts (flexible shafts [F16C 1/00](#); marine propeller shafts, paddle wheel shafts [B63H 23/34](#)); Axles; Cranks; Eccentrics**
- 3/02 . Shafts; Axles
- 3/023 . . {made of several parts, e.g. by welding}
- 3/026 . . {Shafts made of fibre reinforced resin}
- 3/03 . . telescopic (axially displaceable couplings [F16D 3/06](#))
- 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 {by crimping}
- 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
- 7/023 . . {for piston engines, pumps or the like}
- 7/026 . . {made of fibre reinforced resin}
- 7/04 . with elastic intermediate part of 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; Attachments thereof
- 9/045 . . {the bearing cap of the connecting rod being split by fracturing}
- 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](#))
- 11/045 . . {with at least a pair of arms pivoting relatively to at least one other arm, all arms being mounted on one pin (crank-pins [F16C 11/02](#))}
- 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](#))
- 11/0604 . . . {Construction of the male part}
- 11/0609 {made from two or more parts}
- 11/0614 . . . {the female part of the joint being open on two sides}
- 11/0619 . . . {the female part comprising a blind socket receiving the male part}
- 11/0623 {Construction or details of the socket member}
- 11/0628 {with linings}
- 11/0633 {the linings being made of plastics}
- 11/0638 {characterised by geometrical details}
- 11/0642 {Special features of the plug or cover on the blind end of the socket}
- 11/0647 {Special features relating to adjustment for wear or play; Wear indicators}
- 11/0652 {combined with a damper other than elastic linings}
- 11/0657 {the socket member being mainly made of plastics}
- 11/0661 . . . {the two co-operative parts each having both convex and concave interfaces}
- 11/0666 . . . {Sealing means between the socket and the inner member shaft}
- 11/0671 {allowing operative relative movement of joint parts due to flexing of the sealing means}
- 11/0676 {allowing operational relative movement of joint parts due to sliding between parts of the sealing means}
- 11/068 . . . {Special features relating to lubrication}
- 11/0685 . . . {Manufacture of ball-joints and parts thereof, e.g. assembly of ball-joints}

11/069	. . . . {with at least one separate part to retain the ball member in the socket; Quick-release systems}	17/03	. . with tiltably-supported segments, e.g. Michell bearings {(hydrostatic bearings with tiltably supported bearing pads F16C 32/0666 ; made from a plurality of rods F16C 33/26 ; with flexible leaves F16C 17/024 ; hydrodynamic bearings with chambers F16C 33/1075)}
11/0695	. . . {Mounting of ball-joints, e.g. fixing them to a connecting rod}	17/035	. . . {the segments being integrally formed with, or rigidly fixed to, a support-element}
11/08	. . . with resilient bearings	17/04	. for axial load only
11/083	. . . . {by means of parts of rubber or like materials}	17/042	. . {with flexible leaves to create hydrodynamic wedge, e.g. axial foil bearings}
11/086	. . . . . {with an elastomeric member in the blind end of a socket}	17/045	. . {with grooves in the bearing surface to generate hydrodynamic pressure, e.g. spiral groove thrust bearings}
11/10	. . Arrangements for locking	17/047	. . {with fixed wedges to generate hydrodynamic pressure}
11/103	. . . {frictionally clamped}	17/06	. . with tiltably-supported segments, e.g. Michell bearings {(with flexible leaves F16C 17/042 ; hydrostatic F16C 32/0666)}
11/106	. . . . {for ball joints}	17/065	. . . {the segments being integrally formed with, or rigidly fixed to, a support-element}
11/12	. . incorporating flexible connections, e.g. leaf springs	17/08	. . for supporting the end face of a shaft or other member, e.g. footstep bearings
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	17/10	. for both radial and axial load
13/003	. {Bowed or curved rolls (rollers with a bowed axis as centering devices for tensioning, smoothing or guiding webs B65H 23/0258)}	17/102	. . {with grooves in the bearing surface to generate hydrodynamic pressure}
13/006	. {Guiding rollers, wheels or the like, formed by or on the outer element of a single bearing or bearing unit, e.g. two adjacent bearings, whose ratio of length to diameter is generally less than one}	17/105	. . . {with at least one bearing surface providing angular contact, e.g. conical or spherical bearing surfaces}
13/02	. Bearings	17/107	. . . {with at least one surface for radial load and at least one surface for axial load}
13/022	. . {supporting a hollow roll mantle rotating with respect to a yoke or axle}	17/12	. characterised by features not related to the direction of the load
13/024	. . . {adjustable for positioning, e.g. radial movable bearings for controlling the deflection along the length of the roll mantle}	17/14	. . specially adapted for operating in water
13/026	. . . . {by fluid pressure}	17/18	. . with floating brasses or brushing, rotatable at a reduced speed {(F16C 17/03 , F16C 17/06 take precedence)}
13/028	. . . . . {with a plurality of supports along the length of the roll mantle, e.g. hydraulic jacks}	17/20	. . with emergency supports or bearings
13/04	. . Bearings with only partial enclosure of the member to be borne; Bearings with local support at two or more points	17/22	. . with arrangements compensating for thermal expansion
13/06	. . self-adjusting	17/24	. . with devices affected by abnormal or undesired positions, e.g. for preventing overheating, for safety
15/00	Construction of rotary bodies to resist centrifugal force (flywheels, correction weights F16F 15/30 , F16F 15/32)	17/243	. . . {related to temperature and heat, e.g. for preventing overheating}
		17/246	. . . {related to wear, e.g. sensors for measuring wear}
		17/26	. Systems consisting of a plurality of sliding-contact bearings
Bearings for rotary parts		19/00	Bearings with rolling contact, for exclusively rotary movement (adjustable bearings F16C 23/00 , F16C 25/00 {; electrically insulating bearings H02K 5/173 })
17/00	Sliding-contact bearings for exclusively rotary movement (F16C 32/06 takes precedence; adjustable bearings F16C 23/00 , F16C 25/00)	19/02	. with bearing balls essentially of the same size in one or more circular rows
17/02	. for radial load only	19/04	. . for radial load mainly
17/022	. . {with a pair of essentially semicircular bearing sleeves}	19/06	. . . with a single row or balls
17/024	. . {with flexible leaves to create hydrodynamic wedge, e.g. radial foil bearings}	19/08	. . . with two or more rows of balls
17/026	. . {with helical grooves in the bearing surface to generate hydrodynamic pressure, e.g. herringbone grooves}	19/10	. . for axial load mainly
17/028	. . {with fixed wedges to generate hydrodynamic pressure, e.g. multi-lobe bearings}	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

- 19/163 {with angular contact}
- 19/166 {Four-point-contact ball bearings}
- 19/18 . . . with two or more rows of balls
- 19/181 {with angular contact}
- 19/182 {in tandem arrangement}
- 19/183 {with two rows at opposite angles}
- 19/184 {in O-arrangement}
- 19/185 {with two raceways provided integrally on a part other than a race ring, e.g. a shaft or housing}
- 19/186 {with three raceways provided integrally on parts other than race rings, e.g. third generation hubs}
- 19/187 {with all four raceways integrated on parts other than race rings, e.g. fourth generation hubs}
- 19/188 {with at least one row for radial load in combination with at least one row for axial load}
- 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
- 19/225 . . {Details of the ribs supporting the end of the rollers}
- 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
- 19/305 . . . {consisting of rollers held in a cage}
- 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
- 19/361 {with cylindrical rollers}
- 19/362 {the rollers being crossed within the single row}
- 19/364 {with tapered rollers, i.e. rollers having essentially the shape of a truncated cone}
- 19/38 . . . with two or more rows of rollers
- 19/381 {with at least one row for radial load in combination with at least one row for axial load}
- 19/383 {with tapered rollers, i.e. rollers having essentially the shape of a truncated cone}
- 19/385 {with two rows, i.e. double-row tapered roller bearings}
- 19/386 {in O-arrangement}
- 19/388 {with four rows, i.e. four row tapered roller bearings}
- 19/40 . . with loose spacing bodies between the rollers
- 19/44 . . Needle bearings
- 19/46 . . . with one row or needles
- 19/463 {consisting of needle rollers held in a cage, i.e. subunit without race rings}
- 19/466 {comprising needle rollers and an outer ring, i.e. subunit without inner ring}
- 19/48 . . . with two or more rows of needles
- 19/49 . . Bearings with both balls and rollers
- 19/492 . . {with two or more rows with angular contact}
- 19/495 . . . {with two rows}
- 19/497 {in O-arrangement}
- 19/50 . . Other types of ball or roller bearings
- 19/502 . . {with rolling elements in rows not forming a full circle}
- 19/505 . . . {with the diameter of the rolling elements of one row differing from the diameter of those of another row}
- 19/507 . . {with rolling elements journaled in one of the moving parts, e.g. stationary rollers to support a rotating part}
- 19/52 . . with devices affected by abnormal or undesired conditions
- 19/522 . . . {related to load on the bearing, e.g. bearings with load sensors or means to protect the bearing against overload}
- 19/525 . . . {related to temperature and heat, e.g. insulation}
- 19/527 . . . {related to vibration and noise}
- 19/54 . . Systems consisting of a plurality of bearings with rolling friction ([spindle bearings F16C 35/08](#))
- 19/541 . . . {Systems consisting of juxtaposed rolling bearings including at least one angular contact bearing}
- 19/542 . . . {with two rolling bearings with angular contact}
- 19/543 {in O-arrangement}
- 19/545 . . . {Systems comprising at least one rolling bearing for radial load in combination with at least one rolling bearing for axial load}
- 19/546 . . . {Systems with spaced apart rolling bearings including at least one angular contact bearing}
- 19/547 {with two angular contact rolling bearings}
- 19/548 {in O-arrangement}
- 19/55 . . . with intermediate floating {or independently-driven} rings rotating at reduced speed {or with other differential ball or roller bearings}
- 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 19/52](#) take precedence)
- 21/005 . . {the external zone of a bearing with rolling members, e.g. needles, being cup-shaped, with or without a separate thrust-bearing disc or ring, e.g. for universal joints ([seals F16C 33/72](#), [F16D 3/38](#))}
- 23/00** **Bearings for exclusively rotary movement adjustable for aligning or positioning** ([F16C 27/00](#) takes precedence ; hydrostatic bearings [F16C 32/067](#))
- 23/02 . . Sliding-contact bearings
- 23/04 . . self-adjusting
- 23/041 . . . {with edge relief}
- 23/043 . . . {with spherical surfaces, e.g. spherical plain bearings}
- 23/045 {for radial load mainly, e.g. radial spherical plain bearings}
- 23/046 {with split outer rings}
- 23/048 {for axial load mainly}
- 23/06 . . Ball or roller bearings
- 23/08 . . self-adjusting
- 23/082 . . . {by means of at least one substantially spherical surface}
- 23/084 {sliding on a complementary spherical surface}
- 23/086 {forming a track for rolling elements}
- 23/088 {by means of crowning}

23/10	. Bearings, parts of which are eccentrically adjustable with respect to each other	29/0602	. . . {Details of the bearing body or carriage or parts thereof, e.g. methods for manufacturing or assembly}
25/00	Bearings for exclusively rotary movement adjustable for wear or play (F16C 27/00 takes precedence)	29/0604	. . . . {of the load bearing section}
25/02	. Sliding-contact bearings	29/0607	. . . . . {of parts or members for retaining the rolling elements, i.e. members to prevent the rolling elements from falling out of the bearing body or carriage}
25/04	. . self-adjusting	29/0609	. . . . . {of the ends of the bearing body or carriage where the rolling elements change direction, e.g. end caps}
25/045	. . . {with magnetic means to preload the bearing}	29/0611	. . . . . {of the return passages, i.e. the passages where the rolling elements do not carry load}
25/06	. Ball or roller bearings	29/0614	. . . {with a shoe type bearing body, e.g. a body facing one side of the guide rail or track only}
25/08	. . self-adjusting	29/0616	. . . . {for supporting load essentially in a single direction}
25/083	. . . {with resilient means acting axially on a race ring to preload the bearing}	29/0619	. . . . . {with rollers or needles}
25/086	. . . {with magnetic means to preload the bearing}	29/0621	. . . . . {for supporting load in essentially two directions, e.g. by multiple points of contact or two rows of rolling elements}
27/00	Elastic or yielding bearings or bearing supports, for exclusively rotary movement (shock-damping bearings for watches or clocks G04B 31/02)	29/0623	. . . . . {with balls}
27/02	. Sliding-contact bearings	29/0626	. . . . . {with rollers}
27/04	. Ball or roller bearings, e.g. with resilient rolling bodies	29/0628	. . . . . {crossed within a row}
27/045	. . {with a fluid film, e.g. squeeze film damping}	29/063	. . . {with a bearing body, e.g. a carriage or part thereof, provided between the legs of a U-shaped guide rail or track}
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)	29/0633	. . . {with a bearing body defining a U-shaped carriage, i.e. surrounding a guide rail or track on three sides}
27/063	. . {Sliding contact bearings}	29/0635	. . . . {whereby the return paths are provided as bores in a main body of the U-shaped carriage, e.g. the main body of the U-shaped carriage is a single part with end caps provided at each end}
27/066	. . {Ball or roller bearings}	29/0638	. . . . . {with balls}
27/08	. primarily for axial load, e.g. for vertically-arranged shafts	29/064	. . . . . {with two rows of balls, one on each side of the rail}
{Other bearings}		29/0642	. . . . . {with four rows of balls}
29/00	Bearings for parts moving only linearly (F16C 32/06 takes precedence; incorporated in flexible shafts F16C 1/28 {; parts of bearings in general and special methods for making bearings or parts thereof in general F16C 33/00})	29/0645	. . . . . {with load directions in O-arrangement}
29/001	. {adjustable for alignment or positioning}	29/0647	. . . . . {with load directions in X-arrangement}
29/002	. {Elastic or yielding linear bearings or bearing supports}	29/065	. . . . . {with rollers}
29/004	. {Fixing of a carriage or rail, e.g. rigid mounting to a support structure or a movable part}	29/0652	. . . . . {whereby the return paths are at least partly defined by separate parts, e.g. covers attached to the legs of the main body of the U-shaped carriage}
29/005	. {Guide rails or tracks for a linear bearing, i.e. adapted for movement of a carriage or bearing body there along}	29/0654	. . . . . {with balls}
29/007	. {Hybrid linear bearings, i.e. including more than one bearing type, e.g. sliding contact bearings as well as rolling contact bearings}	29/0657	. . . . . {with two rows of balls, one on each side of the rail}
29/008	. {Systems with a plurality of bearings, e.g. four carriages supporting a slide on two parallel rails}	29/0659	. . . . . {with four rows of balls}
29/02	. Sliding-contact bearings	29/0661	. . . . . {with load directions in O-arrangement}
29/025	. . {Hydrostatic or aerostatic (this type of bearing for rotary parts F16C 32/06)}	29/0664	. . . . . {with load directions in X-arrangement}
29/04	. Ball or roller bearings	29/0666	. . . . . {with rollers}
29/041	. . {having rollers crossed within a row}	29/0669	. . . . . {whereby the main body of the U-shaped carriage is an assembly of at least three major parts, e.g. an assembly of a top plate with two separate legs attached thereto in the form of bearing shoes (bearing shoes per se F16C 29/0614)}
29/043	. . {with two massive rectangular rails having facing grooves}	29/0671	. . . . . {with balls}
29/045	. . {having rolling elements journaled in one of the moving parts}		
29/046	. . . {with balls journaled in pockets}		
29/048	. . {with thin walled races, e.g. tracks of sheet metal}		
29/06	. . in which the rolling bodies circulate partly without carrying load		

29/0673	. . . . . {with rollers}	32/0408	. . . . . {Passive magnetic bearings}
29/0676	. . . . . {with a bearing body or carriage almost fully embracing the guide rail or track, e.g. a circular sleeve with a longitudinal slot for the support posts of the rail}	32/041	. . . . . {with permanent magnets on one part attracting the other part}
29/0678	. . . . . {with a bearing body, i.e. the body carrying the circulating rolling elements, provided in the interior of a sleeve-like guide member defining the opposing raceways, e.g. in a telescopic shaft (telescopic shafts with built-in bearings F16C 3/035 ; yielding coupling allowing axial displacement by rolling elements F16D 3/065)}	32/0412	. . . . . {for radial load mainly}
29/068	. . . . . {with the bearing body fully encircling the guide rail or track}	32/0414	. . . . . {with facing axial projections}
29/0683	. . . . . {the bearing body encircles a rail or rod of circular cross-section, i.e. the linear bearing is not suited to transmit torque}	32/0417	. . . . . {for axial load mainly}
29/0685	. . . . . {with balls}	32/0419	. . . . . {with facing radial projections}
29/0688	. . . . . {whereby a sleeve surrounds the circulating balls and thicker part of the sleeve form the load bearing tracks}	32/0421	. . . . . {for both radial and axial load}
29/069	. . . . . {whereby discrete load bearing elements, e.g. discrete load bearing plates or discrete rods, are provided in a retainer and form the load bearing tracks}	32/0423	. . . . . {with permanent magnets on both parts repelling each other}
29/0692	. . . . . {the bearing body encircles a guide rail or track of non-circular cross-section, e.g. with grooves or protrusions, i.e. the linear bearing is suited to transmit torque (telescopic shafts with built-in bearings F16C 3/035 ; yielding coupling allowing axial displacement by rolling elements F16D 3/065)}	32/0425	. . . . . {for radial load mainly}
29/0695	. . . . . {with balls}	32/0427	. . . . . {for axial load mainly}
29/0697	. . . . . {with polygonal guide rail or track}	32/0429	. . . . . {for both radial and axial load, e.g. conical magnets}
29/08	. Arrangements for covering or protecting the ways {(protective coverings for parts of machine tools B23Q 11/08)}	32/0431	. . . . . {with bearings for axial load combined with bearings for radial load}
29/082	. . {fixed to the way}	32/0434	. . . . . {for parts moving linearly}
29/084	. . {fixed to the carriage or bearing body movable along the guide rail or track}	32/0436	. . . . . {with a conductor on one part movable with respect to a magnetic field, e.g. a body of copper on one part and a permanent magnet on the other part}
29/086	. . . {Seals being essentially U-shaped, e.g. for a U-shaped carriage}	32/0438	. . . . . {with a superconducting body, e.g. a body made of high temperature superconducting material such as YBaCuO}
29/088	. . . {Seals extending in the longitudinal direction of the carriage or bearing body}	32/044	. . . . . {Active magnetic bearings}
29/10	. Arrangements for locking the bearings	32/0442	. . . . . {with devices affected by abnormal, undesired or non-standard conditions such as shock-load, power outage, start-up or touchdown}
29/12	. Arrangements for adjusting play	32/0444	. . . . . {Details of devices to control the actuation of the electromagnets}
29/123	. . {using elastic means}	32/0446	. . . . . {Determination of the actual position of the moving member, e.g. details of sensors}
29/126	. . {using tapered surfaces or wedges}	32/0448	. . . . . {by using the electromagnet itself as sensor, e.g. sensorless magnetic bearings}
31/00	Bearings for parts which both rotate and move linearly	32/0451	. . . . . {Details of controllers, i.e. the units determining the power to be supplied, e.g. comparing elements, feedback arrangements with P.I.D. control}
31/02	. Sliding-contact bearings	32/0453	. . . . . {for controlling two axes, i.e. combined control of x-axis and y-axis}
31/04	. Ball or roller bearings	32/0455	. . . . . {including digital signal processing [DSP] and analog/digital conversion [A/D, D/A]}
31/06	. . in which the rolling bodies circulate partly without carrying load	32/0457	. . . . . {Details of the power supply to the electromagnets}
32/00	Bearings not otherwise provided for	32/0459	. . . . . {Details of the magnetic circuit}
32/02	. Knife-edge bearings	32/0461	. . . . . {of stationary parts of the magnetic circuit}
32/04	. using magnetic or electric supporting means	32/0463	. . . . . {with electromagnetic bias, e.g. by extra bias windings}
32/0402	. . {combined with other supporting means, e.g. hybrid bearings with both magnetic and fluid supporting means}	32/0465	. . . . . {with permanent magnets provided in the magnetic circuit of the electromagnets}
32/0404	. . {Electrostatic bearings}	32/0468	. . . . . {of moving parts of the magnetic circuit, e.g. of the rotor}
32/0406	. . {Magnetic bearings}	32/047	. . . . . {Details of housings; Mounting of active magnetic bearings}
		32/0472	. . . . . {for linear movement}
		32/0474	. . . . . {for rotary movement}
		32/0476	. . . . . {with active support of one degree of freedom, e.g. axial magnetic bearings}

- 32/0478 {with permanent magnets to support radial load}
- 32/048 {with active support of two degrees of freedom, e.g. radial magnetic bearings}
- 32/0482 {with three electromagnets to control the two degrees of freedom}
- 32/0485 {with active support of three degrees of freedom}
- 32/0487 {with active support of four degrees of freedom}
- 32/0489 {with active support of five degrees of freedom, e.g. two radial magnetic bearings combined with an axial bearing}
- 32/0491 {with electromagnets acting in axial and radial direction, e.g. with conical magnets}
- 32/0493 {integrated in an electrodynamic machine, e.g. self-bearing motor}
- 32/0495 {generating torque and axial force}
- 32/0497 {generating torque and radial force}
- 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
- 32/0603 {supported by a gas cushion, e.g. an air cushion}
- 32/0607 {the gas being retained in a gap, e.g. squeeze film bearings}
- 32/0611 {by means of vibrations}
- 32/0614 {the gas being supplied under pressure, e.g. aerostatic bearings}
- 32/0618 {via porous material}
- 32/0622 {via nozzles, restrictors}
- 32/0625 {via supply slits}
- 32/0629 {supported by a liquid cushion, e.g. oil cushion}
- 32/0633 {the liquid being retained in a gap}
- 32/0637 {by a magnetic field, e.g. ferrofluid bearings}
- 32/064 {the liquid being supplied under pressure}
- 32/0644 {Details of devices to control the supply of liquids to the bearings}
- 32/0648 {by sensors or pressure-responsive control devices in or near the bearings}
- 32/0651 {Details of the bearing area per se}
- 32/0655 {of supply openings}
- 32/0659 {of pockets or grooves}
- 32/0662 {Details of hydrostatic bearings independent of fluid supply or direction of load}
- 32/0666 {of bearing pads}
- 32/067 {of bearings adjustable for aligning, positioning, wear or play}
- 32/0674 {by means of pre-load on the fluid bearings}
- 32/0677 {of elastic or yielding bearings or bearing supports}
- 32/0681 {Construction or mounting aspects of hydrostatic bearings, for exclusively rotary movement, related to the direction of load}
- 32/0685 {for radial load only}
- 32/0688 {with floating bearing elements}
- 32/0692 {for axial load only}
- 32/0696 {for both radial and axial load}

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
- 33/043 {Sliding surface consisting mainly of ceramics, cermets or hard carbon, e.g. diamond like carbon [DLC]}
- 33/046 {divided or split, e.g. half-bearings or rolled sleeves}
- 33/06 Sliding surface mainly made of metal ([F16C 33/24 - F16C 33/28 take precedence](#); {casting metal bearing surfaces [B22D 15/02](#), [B22D 19/08](#)})
- 33/08 Attachment of brasses, bushes or linings to the bearing housing
- 33/10 Construction relative to lubrication {(lubrication in general [F16N](#))}
- 33/1005 {with gas, e.g. air, as lubricant}
- 33/101 {Details of the bearing surface, e.g. means to generate pressure such as lobes or wedges}
- 33/1015 {Pressure generating grooves}
- 33/102 {with grease as lubricant}
- 33/1025 {with liquid, e.g. oil, as lubricant}
- 33/103 {retained in or near the bearing}
- 33/1035 {by a magnetic field acting on a magnetic liquid}
- 33/104 {in a porous body, e.g. oil impregnated sintered sleeve}
- 33/1045 {Details of supply of the liquid to the bearing}
- 33/105 {Conditioning, e.g. metering, cooling, filtering}
- 33/1055 {from radial inside, e.g. via a passage through the shaft and/or inner sleeve}
- 33/106 {Details of distribution or circulation inside the bearings, e.g. details of the bearing surfaces to affect flow or pressure of the liquid}
- 33/1065 {Grooves on a bearing surface for distributing or collecting the liquid}
- 33/107 {Grooves for generating pressure}
- 33/1075 {Wedges, e.g. ramps or lobes, for generating pressure}
- 33/108 {with a plurality of elements forming the bearing surfaces, e.g. bearing pads}
- 33/1085 {Channels or passages to recirculate the liquid in the bearing}
- 33/109 {Lubricant compositions or properties, e.g. viscosity}
- 33/1095 {with solids as lubricant, e.g. dry coatings, powder}
- 33/12 Structural composition; Use of special materials or surface treatments, e.g. for rust-proofing
- 33/121 {Use of special materials}
- 33/122 {Multilayer structures of sleeves, washers or liners}
- 33/124 {Details of overlays}

33/125	. . . . . {Details of bearing layers, i.e. the lining}	33/3843	. . . . . {formed as one-piece cages, i.e. monoblock cages}
33/127	. . . . . {Details of intermediate layers, e.g. nickel dams}	33/385	. . . . . {made from metal, e.g. cast or machined window cages}
33/128	. . . . . {Porous bearings, e.g. bushes of sintered alloy}	33/3856	. . . . . {made from plastic, e.g. injection moulded window cages}
33/14	. . . . . Special methods of manufacture; Running-in	33/3862	. . . . . {comprising two annular parts joined together}
33/145	. . . . . {of sintered porous bearings}	33/3868	. . . . . {made from metal, e.g. two cast parts joined by rivets}
33/16	. . . Sliding surface consisting mainly of graphite	33/3875	. . . . . {made from plastic, e.g. two injection moulded parts joined by a snap fit}
33/18	. . . Sliding surface consisting mainly of wood or fibrous material	33/3881	. . . . . {with more than three parts, e.g. two end rings connected by individual stays}
33/20	. . . Sliding surface consisting mainly of plastics (F16C 33/22 - F16C 33/28 take precedence)	33/3887	. . . {Details of individual pockets, e.g. shape or ball retaining means}
33/201	. . . . . {Composition of the plastic}	33/3893	. . . {with rolling elements with smaller diameter than the load carrying balls, e.g. cages with counter-rotating spacers}
33/203	. . . . . {Multilayer structures, e.g. sleeves comprising a plastic lining}	33/40	. . . for multiple rows of balls
33/205	. . . . . {with two layers}	33/405	. . . . . {with two or more juxtaposed cages joined together or interacting with each other}
33/206	. . . . . {with three layers}	33/41	. . . comb-shaped
33/208	. . . . . {Methods of manufacture, e.g. shaping, applying coatings}	33/412	. . . . . {Massive or moulded comb cages, e.g. snap ball cages}
33/22	. . . Sliding surface consisting mainly of rubber or synthetic rubber (F16C 33/24 - F16C 33/28 take precedence)	33/414	. . . . . {formed as one-piece cages, i.e. monoblock comb cages}
33/24	. . . with different areas of the sliding surface consisting of different materials	33/416	. . . . . {made from plastic, e.g. injection moulded comb cages}
33/26	. . . made from wire coils; made from a number of discs, rings, rods, or other members	33/418	. . . . . {Details of individual pockets, e.g. shape or ball retaining means}
33/28	. . . with embedded reinforcements shaped as frames or meshed materials	33/42	. . . made from wire or sheet metal strips (F16C 33/40, F16C 33/41 take precedence)
33/30	. Parts of ball or roller bearings	33/422	. . . . . {made from sheet metal}
33/303	. . {of hybrid bearings, e.g. rolling bearings with steel races and ceramic rolling elements}	33/425	. . . . . {from a single part, e.g. ribbon cages with one corrugated annular part}
33/306	. . {Means to synchronise movements}	33/427	. . . . . {from two parts, e.g. ribbon cages with two corrugated annular parts}
33/32	. . Balls	33/44	. . . Selection of substances (F16C 33/40, F16C 33/41 take precedence)
33/34	. . Rollers; Needles	33/445	. . . . . {Coatings}
33/36	. . . with bearing-surfaces other than cylindrical, e.g. tapered; with grooves in the bearing surfaces	33/46	. . Cages for rollers or needles
33/363	. . . . . {with grooves in the bearing-surfaces}	33/4605	. . . {Details of interaction of cage and race, e.g. retention or centring}
33/366	. . . . . {Tapered rollers, i.e. rollers generally shaped as truncated cones}	33/4611	. . . {with hybrid structure, i.e. with parts made of distinct materials}
33/37	. . Loose spacing bodies	33/4617	. . . {Massive or moulded cages having cage pockets surrounding the rollers, e.g. machined window cages}
33/3706	. . . {with concave surfaces conforming to the shape of the rolling elements, e.g. the spacing bodies are in sliding contact with the rolling elements}	33/4623	. . . . . {formed as one-piece cages, i.e. monoblock cages}
33/3713	. . . {with other rolling elements serving as spacing bodies, e.g. the spacing bodies are in rolling contact with the load carrying rolling elements}	33/4629	. . . . . {made from metal, e.g. cast or machined window cages}
33/372	. . . rigid	33/4635	. . . . . {made from plastic, e.g. injection moulded window cages}
33/374	. . . resilient	33/4641	. . . . . {comprising two annular parts joined together}
33/38	. . Ball cages	33/4647	. . . . . {made from metal, e.g. two cast parts joined by rivets}
33/3806	. . . {Details of interaction of cage and race, e.g. retention, centring}	33/4652	. . . . . {made from plastic, e.g. two injection moulded parts joined by a snap fit}
33/3812	. . . {formed of interconnected segments, e.g. chains}	33/4658	. . . . . {comprising three annular parts, i.e. three piece roller cages}
33/3818	. . . {formed of unconnected segments}		
33/3825	. . . {formed as a flexible belt, e.g. spacers connected by a thin film}		
33/3831	. . . {with hybrid structure, i.e. with parts made of distinct materials}		
33/3837	. . . {Massive or moulded cages having cage pockets surrounding the balls, e.g. machined window cages}		

33/4664	. . . . {with more than three parts, e.g. two end rings connected by individual stays}	33/565	. . . . {Coatings}
33/467	. . . {Details of individual pockets, e.g. shape or roller retaining means}	33/58	. . Raceways; Race rings
33/4676	. . . . {of the stays separating adjacent cage pockets, e.g. guide means for the bearing-surface of the rollers}	33/581	. . . {integral with other parts, e.g. with housings or machine elements such as shafts or gear wheels}
33/4682	. . . . {of the end walls, e.g. interaction with the end faces of the rollers}	33/583	. . . {Details of specific parts of races}
33/4688	. . . {with rolling elements with smaller diameter than the load carrying rollers, e.g. cages with counter-rotating spacers}	33/585	. . . . {of raceways, e.g. ribs to guide the rollers}
33/4694	. . . {Single-split roller or needle cages}	33/586	. . . . {outside the space between the races, e.g. end faces or bore of inner ring}
33/48	. . . for multiple rows of rollers or needles	33/588	. . . {Races of sheet metal}
33/485	. . . . {with two or more juxtaposed cages joined together or interacting with each other}	33/60	. . . divided {or split, e.g. comprising two juxtaposed rings}
33/49	. . . comb-shaped	33/605	. . . . {with a separate retaining member, e.g. flange, shoulder, guide ring, secured to a race ring, adjacent to the race surface, so as to abut the end of the rolling elements, e.g. rollers, or the cage}
33/491	. . . . {applied as pairs for retaining both ends of the rollers or needles}	33/61	. . . . formed by wires
33/492	. . . . . {joined by rods}	33/62	. . . Selection of substances
33/494	. . . . {Massive or moulded comb cages}	33/64	. . . Special methods of manufacture
33/495	. . . . . {formed as one piece cages, i.e. monoblock comb cages}	33/66	. . Special parts or details in view of lubrication
33/497	. . . . . {made from metal, e.g. cast or machined comb cages}	33/6603	. . . {with grease as lubricant}
33/498	. . . . . {made from plastic, e.g. injection moulded comb cages}	33/6607	. . . . {Retaining the grease in or near the bearing}
33/50	. . . formed of interconnected members, e.g. chains	33/6611	. . . . . {in a porous or resinous body, e.g. a cage impregnated with the grease}
33/502	. . . . {formed of arcuate segments retaining one or more rollers or needles}	33/6614	. . . . . {in recesses or cavities provided in retainers, races or rolling elements}
33/504	. . . . . {with two segments, e.g. two semicircular cage parts}	33/6618	. . . . . {in a reservoir in the sealing means}
33/506	. . . . {formed as a flexible belt}	33/6622	. . . . {Details of supply and/or removal of the grease, e.g. purging grease}
33/508	. . . . {formed of links having an H-shape, i.e. links with a single stay placed between two rollers and with two end portions extending along the end faces of the two rollers}	33/6625	. . . . . {Controlling or conditioning the grease supply}
33/51	. . . formed of unconnected members	33/6629	. . . . {Details of distribution or circulation inside the bearing, e.g. grooves on the cage or passages in the rolling elements}
33/513	. . . . {formed of arcuate segments for carrying one or more rollers}	33/6633	. . . . {Grease properties or compositions, e.g. rheological properties}
33/516	. . . . . {with two segments, e.g. double-split cages with two semicircular parts}	33/6637	. . . {with liquid lubricant}
33/52	. . . with no part entering between, or touching, the bearing surfaces of the rollers (F16C 33/50 takes precedence)	33/664	. . . . {Retaining the liquid in or near the bearing}
33/523	. . . . {with pins extending into holes or bores on the axis of the rollers}	33/6644	. . . . . {by a magnetic field acting on a magnetic liquid}
33/526	. . . . . {extending through the rollers and joining two lateral cage parts}	33/6648	. . . . . {in a porous or resinous body, e.g. a cage impregnated with the liquid}
33/54	. . . made from wire, strips, or sheet metal (F16C 33/48 , F16C 33/49 take precedence)	33/6651	. . . . . {in recesses or cavities provided in retainers, races or rolling elements}
33/541	. . . . {Details of individual pockets, e.g. shape or roller retaining means}	33/6655	. . . . . {in a reservoir in the sealing means}
33/542	. . . . {made from sheet metal}	33/6659	. . . . {Details of supply of the liquid to the bearing, e.g. passages or nozzles}
33/543	. . . . . {from a single part}	33/6662	. . . . . {the liquid being carried by air or other gases, e.g. mist lubrication}
33/545	. . . . . {rolled from a band}	33/6666	. . . . . {from an oil bath in the bearing housing, e.g. by an oil ring or centrifugal disc}
33/546	. . . . . {with a M- or W-shaped cross section}	33/667	. . . . . {related to conditioning, e.g. cooling, filtering}
33/547	. . . . . {from two parts, e.g. two discs or rings joined together}	33/6674	. . . . . {related to the amount supplied, e.g. gaps to restrict flow of the liquid}
33/548	. . . . . {with more than three parts, e.g. two end rings connected by a plurality of stays or pins}	33/6677	. . . . . {from radial inside, e.g. via a passage through the shaft and/or inner ring}
33/56	. . . Selection of substances (F16C 33/48 , F16C 33/49 take precedence)	33/6681	. . . . {Details of distribution or circulation inside the bearing, e.g. grooves on the cage or passages in the rolling elements}
		33/6685	. . . . {Details of collecting or draining, e.g. returning the liquid to a sump}

- 33/6688 {Lubricant compositions or properties, e.g. viscosity}
- 33/6692 {Liquids other than oil, e.g. water, refrigerants, liquid metal}
- 33/6696 . . . {with solids as lubricant, e.g. dry coatings, powder}
- 33/72 . Sealings
- 33/723 . . {Shaft end sealing means, e.g. cup-shaped caps or covers}
- 33/726 . . {with means to vent the interior of the bearing}
- 33/74 . . of sliding-contact bearings
- 33/741 . . . {by means of a fluid}
- 33/743 {retained in the sealing gap}
- 33/745 {by capillary action}
- 33/746 {by a magnetic field}
- 33/748 {flowing to or from the sealing gap, e.g. vacuum seals with differential exhaust}
- 33/76 . . of ball or roller bearings
- 33/761 . . . {specifically for bearings with purely axial load}
- 33/762 . . . {by means of a fluid}
- 33/763 {retained in the sealing gap}
- 33/765 {by a magnetic field}
- 33/766 {by pumping action}
- 33/767 . . . {integral with the race}
- 33/768 . . . {between relatively stationary parts, i.e. static seals}
- 33/78 . . . with a diaphragm, disc, or ring, with or without resilient members [{\(F16C 33/761 takes precedence\)}](#)
- 33/7803 {suited for particular types of rolling bearings}
- 33/7806 {for spherical roller bearings}
- 33/7809 {for needle roller bearings}
- 33/7813 {for tapered roller bearings}
- 33/7816 {Details of the sealing or parts thereof, e.g. geometry, material}
- 33/782 {of the sealing region}
- 33/7823 {of sealing lips}
- 33/7826 {of the opposing surface cooperating with the seal, e.g. a shoulder surface of a bearing ring}
- 33/783 {of the mounting region}
- 33/7833 {Special methods of manufacture}
- 33/7836 {floating with respect to both races}
- 33/784 {mounted to a groove in the inner surface of the outer race and extending toward the inner race}
- 33/7843 {with a single annular sealing disc}
- 33/7846 {with a gap between the annular disc and the inner race}
- 33/785 {Bearing shields made of sheet metal}
- 33/7853 {with one or more sealing lips to contact the inner race}
- 33/7856 {with a single sealing lip}
- 33/7859 {with a further sealing element}
- 33/7863 {mounted to the inner race, e.g. a flinger to use centrifugal effect}
- 33/7866 {with sealing lips}
- 33/7869 {mounted with a cylindrical portion to the inner surface of the outer race and having a radial portion extending inward}
- 33/7873 {with a single sealing ring of generally L-shaped cross-section}
- 33/7876 {with sealing lips}
- 33/7879 {with a further sealing ring}
- 33/7883 {mounted to the inner race and of generally L-shape, the two sealing rings defining a sealing with box-shaped cross-section}
- 33/7886 {mounted outside the gap between the inner and outer races, e.g. sealing rings mounted to an end face or outer surface of a race}
- 33/7889 {mounted to an inner race and extending toward the outer race}
- 33/7893 {mounted to a cage or integral therewith}
- 33/7896 {with two or more discrete sealings arranged in series}
- 33/80 . . . Labyrinth sealings [{\(F16C 33/761 takes precedence\)}](#)
- 33/805 {in addition to other sealings, e.g. dirt guards to protect sealings with sealing lips}
- 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
- 35/042 . . {Housings for rolling element bearings for rotary movement}
- 35/045 . . . {with a radial flange to mount the housing}
- 35/047 . . . {with a base plate substantially parallel to the axis of rotation, e.g. horizontally mounted pillow blocks}
- 35/06 . . Mounting {or dismounting} of ball or roller bearings; Fixing them onto shaft or in housing
- 35/061 . . . {mounting a plurality of bearings side by side}
- 35/062 . . . {Dismounting of ball or roller bearings}
- 35/063 . . . Fixing them on the shaft [\(with interposition of an element F16C 35/07\)](#)
- 35/0635 {the bore of the inner ring being of special non-cylindrical shape which co-operates with a complementary shape on the shaft, e.g. teeth, polygonal sections}
- 35/067 . . . Fixing them in a housing [\(with interposition of an element F16C 35/07\)](#)
- 35/07 . . . Fixing them on the shaft or housing with interposition of an element
- 35/073 between shaft and inner race ring
- 35/077 between housing and outer race ring
- 35/078 using pressure fluid as mounting aid
- 35/08 . . for spindles
- 35/10 . . with sliding-contact bearings
- 35/12 . . with ball or roller bearings [{\(adjustable bearings F16C 23/00, F16C 25/00; elastic bearings F16C 27/00\)}](#)
- 37/00 Cooling of bearings**
- 37/002 . . {of fluid bearings}
- 37/005 . . {of magnetic bearings}
- 37/007 . . {of rolling bearings}
- 39/00 Relieving load on bearings**
- 39/02 . . using mechanical means
- 39/04 . . using hydraulic or pneumatic means
- 39/06 . . using magnetic means

39/063	. . {Permanent magnets}	2202/70	. Anti-bacterial, anti-microbial
39/066	. . . {with opposing permanent magnets repelling each other}	2204/00	Metallic materials; Alloys (alloys in general C22C; F16C 2206/00 takes precedence)
41/00	Other accessories, {e.g. devices integrated in the bearing not relating to the bearing function as such}	2204/02	. Noble metals
41/001	. {Integrated brakes or clutches for stopping or coupling the relatively movable parts}	2204/04	. . based on silver
41/002	. {Conductive elements, e.g. to prevent static electricity}	2204/10	. Alloys based on copper
41/004	. {Electro-dynamic machines, e.g. motors, generators, actuators}	2204/12	. . with tin as the next major constituent
41/005	. {Fluid passages not relating to lubrication or cooling}	2204/14	. . with zinc as the next major constituent
41/007	. {Encoders, e.g. parts with a plurality of alternating magnetic poles}	2204/16	. . with lead as the next major constituent
41/008	. {Identification means, e.g. markings, RFID-tags; Data transfer means}	2204/18	. . with bismuth as the next major constituent
41/02	. Arrangements for equalising the load on a plurality of bearings or their elements	2204/20	. Alloys based on aluminium
41/04	. Preventing damage to bearings during storage or transport thereof or when otherwise out of use	2204/22	. . with tin as the next major constituent
41/045	. . {Devices for provisionally retaining needles or rollers in a bearing race before mounting of the bearing on a shaft}	2204/24	. . with lead as the next major constituent
43/00	Assembling bearings	2204/26	. Alloys based on magnesium
43/02	. Assembling sliding-contact bearings	2204/30	. Alloys based on one of tin, lead, antimony, bismuth, indium, e.g. materials for providing sliding surfaces
43/04	. Assembling rolling-contact bearings	2204/32	. . Alloys based on lead
43/045	. . {Mounting or replacing seals}	2204/34	. . Alloys based on tin
43/06	. . Placing rolling bodies in cages or bearings	2204/36	. . Alloys based on bismuth
43/065	. . . {in cages}	2204/40	. Alloys based on refractory metals
43/08	. . . by deforming the cages or the races	2204/42	. . Alloys based on titanium
43/083	. . . . {by plastic deformation of the cage}	2204/44	. . Alloys based on chromium
43/086	. . . . {by plastic deformation of the race}	2204/46	. . Alloys based on molybdenum
		2204/50	. Alloys based on zinc
		2204/52	. Alloys based on nickel, e.g. Inconel
		2204/60	. Ferrous alloys, e.g. steel alloys
		2204/62	. . Low carbon steel, i.e. carbon content below 0.4 wt%
		2204/64	. . Medium carbon steel, i.e. carbon content from 0.4 to 0,8 wt%
		2204/66	. . High carbon steel, i.e. carbon content above 0.8 wt%, e.g. through-hardenable steel
		2204/70	. . with chromium as the next major constituent
		2204/72	. . . with nickel as further constituent, e.g. stainless steel
		2204/74	. . with manganese as the next major constituent
		2204/80	. Amorphous alloys
2202/00	Solid materials defined by their properties	2206/00	Materials with ceramics, cermets, hard carbon or similar non-metallic hard materials as main constituents
2202/02	. Mechanical properties	2206/02	. Carbon based material
2202/04	. . Hardness	2206/04	. . Diamond like carbon [DLC]
2202/06	. . Strength or rigidity	2206/06	. . Composite carbon material, e.g. carbon fibre reinforced carbon (C/C)
2202/08	. . Resilience, elasticity, super-elasticity	2206/40	. Ceramics, e.g. carbides, nitrides, oxides, borides of a metal
2202/10	. . Porosity	2206/42	. . based on ceramic oxides
2202/20	. Thermal properties	2206/44	. . . based on aluminium oxide (Al ₂ O ₃)
2202/22	. . Coefficient of expansion	2206/48	. . . based on zirconia (ZrO ₂)
2202/24	. . Insulating	2206/56	. . based on ceramic carbides, e.g. silicon carbide (SiC)
2202/28	. . Shape memory material	2206/58	. . based on ceramic nitrides
2202/30	. Electric properties; Magnetic properties	2206/60	. . . Silicon nitride (Si ₃ N ₄)
2202/32	. . Conductivity	2206/80	. Cermets, i.e. composites of ceramics and metal (in general C22C 29/00)
2202/34	. . . Superconductivity	2206/82	. . based on tungsten carbide [WC]
2202/36	. . Piezo-electric	2208/00	Plastics; Synthetic resins, e.g. rubbers
2202/40	. . Magnetic (magnetic material in general H01F 1/00)	2208/02	. comprising fillers, fibres
2202/42	. . . soft-magnetic, ferromagnetic	2208/04	. . Glass fibres
2202/44	. . . hard-magnetic, permanent magnetic, e.g. samarium-cobalt	2208/10	. Elastomers; Rubbers
2202/50	. Lubricating properties	2208/12	. . Polyurethan [PU]
2202/52	. . Graphite		
2202/54	. . Molybdenum disulfide		
2202/60	. Oil repelling		
2202/64	. Water absorbing		
2202/66	. Water repelling		

- 2208/14 . . Silicone rubber
- 2208/20 . Thermoplastic resins
- 2208/22 . . comprising two or more thermoplastics
- 2208/30 . . Fluoropolymers ([F16C 2208/58 takes precedence](#))
- 2208/32 . . . Polytetrafluorethylene [PTFE] ([F16C 2208/58 takes precedence](#))
- 2208/34 . . . Polyvinylidene fluoride [PVDF] ([F16C 2208/58 takes precedence](#))
- 2208/36 . . Polyarylene ether ketones [PAEK], e.g. PEK, PEEK ([F16C 2208/58 takes precedence](#))
- 2208/40 . . Imides, e.g. polyimide [PI], polyetherimide [PEI] ([F16C 2208/58 takes precedence](#))
- 2208/42 . . . Polyamideimide [PAI] ([F16C 2208/58 takes precedence](#))
- 2208/44 . . . Polybenzimidazole [PBI] ([F16C 2208/58 takes precedence](#))
- 2208/48 . . Liquid crystal polymers [LCP] ([F16C 2208/58 takes precedence](#))
- 2208/52 . . Polyphenylene sulphide [PPS] ([F16C 2208/58 takes precedence](#))
- 2208/54 . . Polysulphones, e.g. polysulphone [PSU], polyethersulphone [PES], polyethersulphone-block copolymer [PPSU] ([F16C 2208/58 takes precedence](#))
- 2208/58 . . Several materials as provided for in [F16C 2208/30](#) - [F16C 2208/54](#) mentioned as option
- 2208/60 . . Polyamides [PA]
- 2208/62 . . . high performance polyamides, e.g. PA12, PA46
- 2208/66 . . Acetals, e.g. polyoxymethylene [POM]
- 2208/70 . . Polyesters, e.g. polyethylene-terephthalate [PET], polybutylene-terephthalate [PBT]
- 2208/72 . . Acrylics, e.g. polymethylmethacrylate [PMMA]
- 2208/76 . . Polyolefins, e.g. polypropylene [PP]
- 2208/78 . . . Polyethylene [PE], e.g. ultra-high molecular weight polyethylene [UHMWPE]
- 2208/80 . Thermosetting resins
- 2208/82 . . Composites, i.e. fibre reinforced thermosetting resins
- 2208/86 . . Epoxy resins
- 2208/90 . . Phenolic resin
- 2210/00 Fluids**
- 2210/02 . defined by their properties
- 2210/04 . . by viscosity
- 2210/06 . . magnetic fluids
- 2210/08 . molten metals
- 2210/10 . water based
- 2212/00 Natural materials, i.e. based on animal or plant products such as leather, wood or cotton or extracted therefrom, e.g. lignin**
- 2212/04 . Wood
- 2212/08 . Woven, unwoven fabrics, e.g. felt
- 2220/00 Shaping**
- 2220/02 . by casting ([in general B22D](#); for plastics [B29C 39/00](#))
- 2220/04 . . by injection-moulding ([of plastics in general B29C 45/00](#))
- 2220/06 . . [in situ](#) casting or moulding
- 2220/08 . . by compression-moulding
- 2220/20 . by sintering pulverised material, e.g. powder metallurgy ([in general B22F](#))
- 2220/24 . by built-up welding ([in general B23K 9/04](#))
- 2220/28 . by winding impregnated fibres ([in general B29C 70/00](#))
- 2220/40 . by deformation without removing material
- 2220/42 . . by working of thin walled material such as sheet or tube ([in general B21D](#))
- 2220/44 . . by rolling ([in general B21H](#))
- 2220/46 . . by forging ([in general B21J](#))
- 2220/48 . . by extrusion, e.g. of metallic profiles ([in general B21C 23/00](#))
- 2220/60 . by removing material, e.g. machining
- 2220/62 . . by turning, boring, drilling ([in general B23B](#))
- 2220/66 . . by milling ([in general B23C](#))
- 2220/68 . . by electrical discharge or electrochemical machining ([in general B23H](#))
- 2220/70 . . by grinding ([in general B24B](#))
- 2220/80 . by separating parts, e.g. by severing, cracking
- 2220/82 . . by cutting ([in general B26D](#))
- 2220/84 . . by perforating; by punching; by stamping-out ([in general B26F](#))
- 2223/00 Surface treatments; Hardening; Coating**
- 2223/02 . Mechanical treatment, e.g. finishing
- 2223/04 . . by sizing, by shaping to final size by small plastic deformation, e.g. by calibrating or coining ([in general B23P 9/00](#))
- 2223/06 . . polishing ([in general B24B 29/00](#), [B24B 31/00](#))
- 2223/08 . . shot-peening, blasting ([in general B24C](#))
- 2223/10 . Hardening, e.g. carburizing, carbo-nitriding ([in general C21D](#), [C23C 8/00](#))
- 2223/12 . . with carburizing
- 2223/14 . . with nitriding
- 2223/16 . . with carbo-nitriding
- 2223/18 . . with induction hardening
- 2223/30 . Coating surfaces ([in general B05C](#), [C23C](#))
- 2223/32 . . by attaching pre-existing layers, e.g. resin sheets or foils by adhesion to a substrate; Laminating ([in general B32B](#))
- 2223/40 . . by dipping in molten material ([in general C23C 2/00](#))
- 2223/42 . . by spraying the coating material, e.g. plasma spraying ([in general C23C 4/00](#))
- 2223/44 . . by casting molten material on the substrate ([in general C23C 6/00](#))
- 2223/46 . . by welding, e.g. by using a laser to build a layer ([in general B23K 9/04](#))
- 2223/60 . . by vapour deposition, e.g. PVD, CVD ([in general C23C 14/00](#))
- 2223/70 . . by electroplating or electrolytic coating, e.g. anodising, galvanising ([in general C25D](#))
- 2223/80 . . by powder coating ([in general B22F 7/00](#))
- 2226/00 Joining parts; Fastening; Assembling or mounting parts (fasteners, securing, joints in general F16B)**
- 2226/10 . Force connections, e.g. clamping ([shrinkage connections, force fits, friction grips in general F16B 4/00](#), for rigidly connecting coaxial parts [F16D 1/00](#))
- 2226/12 . . by press-fit, e.g. plug-in
- 2226/14 . . by shrink fit, i.e. heating and shrinking part to allow assembly ([for metal parts in general B23P 11/02](#))
- 2226/16 . . by wedge action, e.g. by tapered or conical parts

- 2226/18 . . by magnets, i.e. magnetic attraction to hold parts together
- 2226/30 . Material joints ([in general B23K](#))
- 2226/32 . . by soldering
- 2226/34 . . . by brazing
- 2226/36 . . by welding
- 2226/38 . . . with ultrasonic welding
- 2226/40 . . with adhesive
- 2226/50 . Positive connections
- 2226/52 . . with plastic deformation, e.g. caulking or staking
- 2226/54 . . . with rivets ([in general F16B 19/00](#))
- 2226/60 . . with threaded parts, e.g. bolt and nut connections ([in general F16B 23/00 - F16B 43/00](#))
- 2226/62 . . with pins, bolts or dowels
- 2226/70 . . with complementary interlocking parts
- 2226/72 . . . with bayonet joints, i.e. parts are rotated to create positive interlock
- 2226/74 . . . with snap-fit, e.g. by clips
- 2226/76 . . . with tongue and groove or key and slot
- 2226/78 of jigsaw-puzzle type
- 2226/80 . . with splines, serrations or similar profiles to prevent movement between joined parts
- 2229/00** **Setting preload**
- 2231/00** **Running-in; Initial operation**
- 2233/00** **Monitoring condition, e.g. temperature, load, vibration**
- 2235/00** **Cleaning**
- 2237/00** **Repair or replacement**
- 2240/00** **Specified values or numerical ranges of parameters; Relations between them ([properties of materials F16C 2202/00](#))**
- 2240/02 . Flow, e.g. volume flow or mass flow
- 2240/06 . Temperature
- 2240/08 . Time
- 2240/12 . Force, load, stress, pressure
- 2240/14 . . Preload
- 2240/18 . . Stress
- 2240/22 . . Fluid pressure
- 2240/26 . Speed, e.g. rotational speed
- 2240/30 . Angles, e.g. inclinations
- 2240/34 . . Contact angles
- 2240/40 . Linear dimensions, e.g. length, radius, thickness, gap
- 2240/42 . . Groove sizes
- 2240/44 . . Hole or pocket sizes
- 2240/46 . . Gap sizes or clearances
- 2240/48 . . Particle sizes
- 2240/50 . . Crowning, e.g. crowning height or crowning radius
- 2240/54 . . Surface roughness
- 2240/56 . . Tolerances; Accuracy of linear dimensions
- 2240/60 . . Thickness, e.g. thickness of coatings
- 2240/64 . . . in the nanometer range
- 2240/70 . . Diameters; Radii
- 2240/76 . . . Osculation, i.e. relation between radii of balls and raceway groove
- 2240/80 . . . Pitch circle diameters [PCD]
- 2240/82 Degree of filling, i.e. sum of diameters of rolling elements in relation to PCD
- 2240/84 with full complement of balls or rollers, i.e. sum of clearances less than diameter of one rolling element
- 2240/90 . Surface areas
- 2240/94 . Volume
- 2300/00** **Application independent of particular apparatuses**
- 2300/02 . General use or purpose, i.e. no use, purpose, special adaptation or modification indicated or a wide variety of uses mentioned
- 2300/10 . related to size
- 2300/12 . . Small applications, e.g. miniature bearings
- 2300/14 . . Large applications, e.g. bearings having an inner diameter exceeding 500 mm
- 2300/20 . related to type of movement
- 2300/22 . . High-speed rotation
- 2300/28 . . Reciprocating movement
- 2300/30 . related to direction with respect to gravity
- 2300/32 . . Horizontal, e.g. bearings for supporting a horizontal shaft
- 2300/34 . . Vertical, e.g. bearings for supporting a vertical shaft
- 2300/40 . related to environment, i.e. operating conditions
- 2300/42 . . corrosive, i.e. with aggressive media or harsh conditions
- 2300/52 . . low temperature, e.g. cryogenic temperature
- 2300/54 . . high-temperature
- 2300/62 . . low pressure, e.g. elements operating under vacuum conditions
- 2300/64 . . high pressure, e.g. elements exposed to high pressure gases or fluids
- 2310/00** **Agricultural machines ([in general A01](#))**
- 2314/00** **Personal or domestic articles, e.g. household appliances such as washing machines, dryers ([in general A41 - A47](#))**
- 2314/70 . Furniture
- 2314/72 . . Drawers
- 2314/73 . . Chairs
- 2316/00** **Apparatus in health or amusement ([in general A61 - A63](#))**
- 2316/10 . in medical appliances, e.g. in diagnosis, dentistry, instruments, prostheses, medical imaging appliances
- 2316/13 . . Dental machines
- 2316/18 . . Pumps for pumping blood
- 2316/30 . Articles for sports, games and amusement, e.g. roller skates, toys
- 2320/00** **Apparatus used in separating or mixing ([in general B01 - B09](#))**
- 2320/16 . Mixing apparatus
- 2320/23 . Milling apparatus ([in general B02C](#))
- 2320/42 . Centrifuges ([in general B04B](#))
- 2322/00** **Apparatus used in shaping articles ([in general B21 - B32](#))**
- 2322/12 . Rolling apparatus, e.g. rolling stands, rolls
- 2322/14 . Stamping, deep-drawing or punching, e.g. die sets
- 2322/34 . Sawing machines ([in general B23D](#))
- 2322/39 . General build up of machine tools, e.g. spindles, slides, actuators ([in general B23Q](#))
- 2322/50 . Hand tools, workshop equipment or manipulators ([in general B25](#))

- 2322/59 . . Manipulators, e.g. robot arms ([in general B25J](#))
- 2324/00 Apparatus used in printing ([in general B41 - B44](#))**
- 2324/16 . Printing machines ([in general B41F](#))
- 2326/00 Articles relating to transporting ([in general B60 - B68](#))**
- 2326/01 . Parts of vehicles in general ([engines F16C 2360/00](#))
- 2326/02 . . Wheel hubs or castors ([in general B60B](#))
- 2326/05 . . Vehicle suspensions, e.g. bearings, pivots or connecting rods used therein ([in general B60G](#))
- 2326/06 . . Drive shafts ([in general B60K](#))
- 2326/08 . . Vehicle seats, e.g. in linear movable seats ([in general B60N](#))
- 2326/09 . . Windscreen wipers, e.g. pivots therefore ([in general B60S](#))
- 2326/10 . Railway vehicles ([in general B61](#))
- 2326/20 . Land vehicles ([in general B62](#))
- 2326/24 . . Steering systems, e.g. steering rods or columns ([in general B62D](#))
- 2326/26 . . Bicycle steering or suspension ([in general B62K](#))
- 2326/28 . . Bicycle propulsion, e.g. crankshaft and its support ([in general B62M](#))
- 2326/30 . Ships, e.g. propelling shafts and bearings therefor ([in general B63H](#))
- 2326/43 . Aeroplanes; Helicopters ([in general B64C](#))
- 2326/47 . Cosmonautic vehicles, i.e. bearings adapted for use in outer-space ([in general B64G](#))
- 2326/58 . Conveyor systems, e.g. rollers or bearings therefor ([in general B65G](#))
- 2340/00 Apparatus for treating textiles ([in general D01 - D07](#))**
- 2340/18 . Apparatus for spinning or twisting ([in general D01H](#))
- 2340/24 . Godet rolls ([in general D02](#))
- 2350/00 Machines or articles related to building ([in general E01 - E06](#))**
- 2350/26 . Excavators ([in general E02F](#))
- 2350/52 . Locks, e.g. cables to actuate door locks ([in general E05B](#))
- 2350/54 . Hinges, e.g. sliding bearings for hinges ([in general E05D](#))
- 2352/00 Apparatus for drilling ([in general E21](#))**
- 2360/00 Engines or pumps ([in general F01 - F04](#))**
- 2360/18 . Camshafts ([in general F01L](#))
- 2360/22 . Internal combustion engines ([in general F02B](#))
- 2360/23 . Gas turbine engines ([in general F02C](#))
- 2360/24 . . Turbochargers ([in general F02C 6/12](#))
- 2360/31 . Wind motors ([in general F03D](#))
- 2360/42 . Pumps with cylinders or pistons ([in general F04B](#))
- 2360/43 . Screw compressors ([in general F04C](#))
- 2360/44 . Centrifugal pumps ([in general F04D](#))
- 2360/45 . . Turbo-molecular pumps ([in general F04D 19/04](#))
- 2360/46 . Fans, e.g. ventilators
- 2361/00 Apparatus or articles in engineering in general ([F15 - F17](#))**
- 2361/31 . Axle
- 2361/41 . Couplings ([in general F16D 3/00](#))
- 2361/43 . Clutches, e.g. disengaging bearing ([in general F16D 11/00 - F16D 47/00](#))
- 2361/45 . Brakes ([in general B60T, F16D 49/00 - F16D 65/00](#))
- 2361/53 . Spring-damper, e.g. gas springs ([in general F16F 9/00](#))
- 2361/55 . Flywheel systems ([in general F16F 15/00](#))
- 2361/61 . Toothed gear systems, e.g. support of pinion shafts ([in general F16H 57/02](#))
- 2361/63 . Gears with belts and pulleys
- 2361/65 . Gear shifting, change speed gear, gear box
- 2361/71 . Chains ([in general F16G](#))
- 2361/91 . Valves
- 2362/00 Apparatus for lighting or heating ([in general F21 - F28](#))**
- 2362/40 . Ovens or other heatings ([in general F24](#))
- 2362/52 . Compressors of refrigerators, e.g. air-conditioners ([in general F25](#))
- 2370/00 Apparatus relating to physics, e.g. instruments ([in general G01 - G12](#))**
- 2370/12 . Hard disk drives or the like
- 2370/20 . Optical, e.g. movable lenses or mirrors; Spectacles ([in general G02](#))
- 2370/22 . . Polygon mirror
- 2370/38 . Electrographic apparatus ([in general G03G](#))
- 2380/00 Electrical apparatus ([in general H01 - H05](#))**
- 2380/16 . X-ray tubes ([in general H01J 35/00](#))
- 2380/18 . Handling tools for semiconductor devices
- 2380/26 . Dynamo-electric machines or combinations therewith, e.g. electro-motors and generators ([in general H02K](#))
- 2380/27 . . Motor coupled with a gear, e.g. worm gears
- 2380/28 . . Motor, generator coupled with a flywheel