

CPC COOPERATIVE PATENT CLASSIFICATION

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

NOTES

- 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.
- Attention is drawn to the following places:

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

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| 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 | 1/18 | . . . in which the end portion of the flexible member is laid along a curved surface of a pivoted member |
| 1/02 | . for conveying rotary movements | 1/20 | . . Construction of flexible members moved to and fro in the sheathing |
| 1/04 | . . Articulated shafts | 1/205 | . . . {Details of the outer surface of the flexible member, e.g. coatings} |
| 1/06 | . . with guiding sheathing, tube or box (F16C 1/04 takes precedence; guiding sheathings F16C 1/26) | 1/22 | . . Adjusting; Compensating length |
| 1/08 | . . End connections | 1/223 | . . . {by adjusting the effective length of the flexible member} |
| 1/10 | . Means for transmitting linear movement in a flexible sheathing, e.g. "Bowden-mechanisms" (guiding-sheathings F16C 1/26) | 1/226 | . . . {by adjusting the effective length of the sheathing} |
| 1/101 | . . {Intermediate connectors for joining portions of split flexible shafts and/or sheathings} | 1/24 | . Lubrication; Lubricating equipment |
| 1/102 | . . {Arrangements to mount end fittings of the sheathings to support walls or brackets} | 1/26 | . Construction of guiding-sheathings or guiding-tubes |
| 1/103 | . . . {to a hole in the wall or bracket} | 1/262 | . . {End fittings; Attachment thereof to the sheathing or tube} |
| 1/105 | . . . {to a slot in the bracket} | 1/265 | . . . {with a swivel tube connected to the end-fitting of a sheathing, e.g. with a spherical joint} |
| 1/106 | . . {Plurality of transmitting means, e.g. two or more parallel "Bowden cables"} | 1/267 | . . {Details of the inner surface of the sheathing or tube, e.g. coatings} |
| 1/107 | . . {Sealing details} | 1/28 | . . with built in bearings {, e.g. sheathing with rolling elements between the sheathing and the core element} |
| 1/108 | . . {Reducing or controlling of vibrations, e.g. by resilient damping of noise} | 3/00 | Shafts (flexible shafts F16C 1/00; marine propeller shafts, paddle wheel shafts B63H 23/34); Axles; Cranks; eccentrics |
| 1/12 | . . Arrangements for transmitting movement to or from the flexible member | 3/02 | . Shafts; Axles |
| 1/14 | . . . Construction of the end-piece of the flexible member; Attachment thereof to the flexible member | 3/023 | . . {made of several parts, e.g. by welding} |
| 1/145 | {Attachment of the end-piece to the flexible member} | 3/026 | . . {Shafts made of fibre reinforced resin} |
| 1/16 | . . . in which the end-piece is guided rectilinearly | 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}
- 11/0695 . . . {Mounting of ball-joints, e.g. fixing them to a connecting rod}
- 11/08 . . . with resilient bearings
- 11/083 {by means of parts of rubber or like materials}
- 11/086 {with an elastomeric member in the blind end of a socket}
- 11/10 . . Arrangements for locking
- 11/103 . . . {frictionally clamped}
- 11/106 {for ball joints}
- 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**
- 13/003 . {Bowed or curved rolls (rollers with a bowed axis as tentering devices for tensioning, smoothing or guiding webs [B65H 23/0258](#))}
- 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}
- 13/02 . Bearings
- 13/022 . . {supporting a hollow roll mantle rotating with respect to a yoke or axle}

- 13/024 . . . {adjustable for positioning, e.g. radial movable bearings for controlling the deflection along the length of the roll mantle}
- 13/026 {by fluid pressure}
- 13/028 {with a plurality of supports along the length of the roll mantle, e.g. hydraulic jacks}
- 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](#))
- 17/02 . for radial load only
- 17/022 . . {with a pair of essentially semicircular bearing sleeves}
- 17/024 . . {with flexible leaves to create hydrodynamic wedge, e.g. radial foil bearings}
- 17/026 . . {with helical grooves in the bearing surface to generate hydrodynamic pressure, e.g. herringbone grooves}
- 17/028 . . {with fixed wedges to generate hydrodynamic pressure, e.g. multi-lobe bearings}
- 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 \[F16C 33/1075\]\(#\)](#)}
- 17/035 . . . {the segments being integrally formed with, or rigidly fixed to, a support-element}
- 17/04 . for axial load only
- 17/042 . . {with flexible leaves to create hydrodynamic wedge, e.g. axial foil bearings}
- 17/045 . . {with grooves in the bearing surface to generate hydrodynamic pressure, e.g. spiral groove thrust bearings}
- 17/047 . . {with fixed wedges to generate hydrodynamic pressure}
- 17/06 . . with tiltably-supported segments, e.g. Michell bearings {[\(with flexible leaves \[F16C 17/042\]\(#\); hydrostatic \[F16C 32/0666\]\(#\)\)](#)}
- 17/065 . . . {the segments being integrally formed with, or rigidly fixed to, a support-element}
- 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
- 17/102 . . {with grooves in the bearing surface to generate hydrodynamic pressure}
- 17/105 . . . {with at least one bearing surface providing angular contact, e.g. conical or spherical bearing surfaces}
- 17/107 . . . {with at least one surface for radial load and at least one surface for 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 brushing, rotatable at a reduced speed {[\(F16C 17/03, F16C 17/06 take precedence\)](#)}
- 17/20 . . with emergency supports or bearings
- 17/22 . . with arrangements compensating for thermal expansion
- 17/24 . . with devices affected by abnormal or undesired positions, e.g. for preventing overheating, for safety
- 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

19/00 Bearings with rolling contact, for exclusively rotary movement ([adjustable bearings \[F16C 23/00\]\(#\), \[F16C 25/00\]\(#\); {electrically insulating bearings \[H02K 5/173\]\(#\)}](#))

- 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 or 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
- 19/163 {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
- 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
- 25/045 . . . {with magnetic means to preload the bearing}
- 25/06 . Ball or roller bearings
- 25/08 . . self-adjusting
- 25/083 . . . {with resilient means acting axially on a race ring to preload the bearing}
- 25/086 . . . {with magnetic means to preload the bearing}
- 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
- 27/045 . . {with a fluid film, e.g. squeeze film damping}
- 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](#))
- 27/063 . . {Sliding contact bearings}
- 27/066 . . {Ball or roller bearings}
- 27/08 . primarily for axial load, e.g. for vertically-arranged shafts

Other bearings {(for bridges [E01D 19/04](#))}**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](#)})

- 29/001 . {adjustable for alignment or positioning}
- 29/002 . {Elastic or yielding linear bearings or bearing supports}
- 29/004 . {Fixing of a carriage or rail, e.g. rigid mounting to a support structure or a movable part}
- 29/005 . {Guide rails or tracks for a linear bearing, i.e. adapted for movement of a carriage or bearing body there along}
- 29/007 . {Hybrid linear bearings, i.e. including more than one bearing type, e.g. sliding contact bearings as well as rolling contact bearings}
- 29/008 . {Systems with a plurality of bearings, e.g. four carriages supporting a slide on two parallel rails}
- 29/02 . Sliding-contact bearings
- 29/025 . . {Hydrostatic or aerostatic (this type of bearing for rotary parts [F16C 32/06](#))}
- 29/04 . Ball or roller bearings
- 29/041 . . {having rollers crossed within a row}
- 29/043 . . {with two massive rectangular rails having facing grooves}
- 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
- 29/0602 . . . {Details of the bearing body or carriage or parts thereof, e.g. methods for manufacturing or assembly}
- 29/0604 {of the load bearing section}
- 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}
- 29/0609 {of the ends of the bearing body or carriage where the rolling elements change direction, e.g. end caps}
- 29/0611 {of the return passages, i.e. the passages where the rolling elements do not carry load}
- 29/0614 . . . {with a shoe type bearing body, e.g. a body facing one side of the guide rail or track only}
- 29/0616 {for supporting load essentially in a single direction}
- 29/0619 {with rollers or needles}
- 29/0621 {for supporting load in essentially two directions, e.g. by multiple points of contact or two rows of rolling elements}
- 29/0623 {with balls}
- 29/0626 {with rollers}
- 29/0628 {crossed within a row}
- 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}
- 29/0633 . . . {with a bearing body defining a U-shaped carriage, i.e. surrounding a guide rail or track on three sides}

- 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}
- 29/0638 {with balls}
- 29/064 {with two rows of balls, one on each side of the rail}
- 29/0642 {with four rows of balls}
- 29/0645 {with load directions in O-arrangement}
- 29/0647 {with load directions in X-arrangement}
- 29/065 {with rollers}
- 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}
- 29/0654 {with balls}
- 29/0657 {with two rows of balls, one on each side of the rail}
- 29/0659 {with four rows of balls}
- 29/0661 {with load directions in O-arrangement}
- 29/0664 {with load directions in X-arrangement}
- 29/0666 {with rollers}
- 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](#))}
- 29/0671 {with balls}
- 29/0673 {with rollers}
- 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}
- 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](#))}
- 29/068 . . . {with the bearing body fully encircling the guide rail or track}
- 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}
- 29/0685 {with balls}
- 29/0688 {whereby a sleeve surrounds the circulating balls and thicker part of the sleeve form the load bearing tracks}
- 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}

- 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](#))}
- 29/0695 {with balls}
- 29/0697 {with polygonal guide rail or track}
- 29/08 . . Arrangements for covering or protecting the ways {([protective coverings for parts of machine tools B23Q 11/08](#))}
- 29/082 . . {fixed to the way}
- 29/084 . . {fixed to the carriage or bearing body movable along the guide rail or track}
- 29/086 . . . {Seals being essentially U-shaped, e.g. for a U-shaped carriage}
- 29/088 . . . {Seals extending in the longitudinal direction of the carriage or bearing body}
- 29/10 . Arrangements for locking the bearings
- 29/12 . Arrangements for adjusting play
- 29/123 . . {using elastic means}
- 29/126 . . {using tapered surfaces or wedges}
- 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
- 32/0402 . . {combined with other supporting means, e.g. hybrid bearings with both magnetic and fluid supporting means}
- 32/0404 . . {Electrostatic bearings}
- 32/0406 . . {Magnetic bearings}
- 32/0408 . . . {Passive magnetic bearings}
- 32/041 {with permanent magnets on one part attracting the other part}
- 32/0412 {for radial load mainly}
- 32/0414 {with facing axial projections}
- 32/0417 {for axial load mainly}
- 32/0419 {with facing radial projections}
- 32/0421 {for both radial and axial load}
- 32/0423 {with permanent magnets on both parts repelling each other}
- 32/0425 {for radial load mainly}
- 32/0427 {for axial load mainly}
- 32/0429 {for both radial and axial load, e.g. conical magnets}
- 32/0431 {with bearings for axial load combined with bearings for radial load}
- 32/0434 {for parts moving linearly}
- 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}
- 32/0438 {with a superconducting body, e.g. a body made of high temperature superconducting material such as YBaCuO}
- 32/044 . . . {Active magnetic bearings}
- 32/0442 {with devices affected by abnormal, undesired or non-standard conditions such as shock-load, power outage, start-up or touchdown}
- 32/0444 {Details of devices to control the actuation of the electromagnets}
- 32/0446 {Determination of the actual position of the moving member, e.g. details of sensors}
- 32/0448 {by using the electromagnet itself as sensor, e.g. sensorless magnetic bearings}
- 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}
- 32/0453 {for controlling two axes, i.e. combined control of x-axis and y-axis}
- 32/0455 {including digital signal processing [DSP] and analog/digital conversion [A/D, D/A]}
- 32/0457 {Details of the power supply to the electromagnets}
- 32/0459 {Details of the magnetic circuit}
- 32/0461 {of stationary parts of the magnetic circuit}
- 32/0463 {with electromagnetic bias, e.g. by extra bias windings}
- 32/0465 {with permanent magnets provided in the magnetic circuit of the electromagnets}
- 32/0468 {of moving parts of the magnetic circuit, e.g. of the rotor}
- 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}
- 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}
- 33/127 . . . {Details of intermediate layers, e.g. nickel dams}
- 33/128 . . . {Porous bearings, e.g. bushes of sintered alloy}
- 33/14 . . . Special methods of manufacture; Running-in
- 33/145 . . . {of sintered porous bearings}
- 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)
- 33/201 . . . {Composition of the plastic}
- 33/203 . . . {Multilayer structures, e.g. sleeves comprising a plastic lining}
- 33/205 . . . {with two layers}
- 33/206 . . . {with three layers}
- 33/208 . . . {Methods of manufacture, e.g. shaping, applying coatings}
- 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

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}
- 33/14 . . . Special methods of manufacture; Running-in
- 33/145 . . . {of sintered porous bearings}
- 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)
- 33/201 . . . {Composition of the plastic}
- 33/203 . . . {Multilayer structures, e.g. sleeves comprising a plastic lining}
- 33/205 . . . {with two layers}
- 33/206 . . . {with three layers}
- 33/208 . . . {Methods of manufacture, e.g. shaping, applying coatings}
- 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	33/418	. . . . {Details of individual pockets, e.g. shape or ball retaining means}
33/303	. . {of hybrid bearings, e.g. rolling bearings with steel races and ceramic rolling elements}	33/42	. . . made from wire or sheet metal strips (F16C 33/40 , F16C 33/41 take precedence)
33/306	. . {Means to synchronise movements}	33/422	. . . . {made from sheet metal}
33/32	. . Balls	33/425	. . . . . {from a single part, e.g. ribbon cages with one corrugated annular part}
33/34	. . Rollers; Needles	33/427	. . . . . {from two parts, e.g. ribbon cages with two corrugated annular parts}
33/36	. . . with bearing-surfaces other than cylindrical, e.g. tapered; with grooves in the bearing surfaces	33/44	. . . Selection of substances (F16C 33/40 , F16C 33/41 take precedence)
33/363	. . . . {with grooves in the bearing-surfaces}	33/445	. . . . . {Coatings}
33/366	. . . . {Tapered rollers, i.e. rollers generally shaped as truncated cones}	33/46	. . Cages for rollers or needles
33/37	. . Loose spacing bodies	33/4605	. . . {Details of interaction of cage and race, e.g. retention or centring}
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}	33/4611	. . . {with hybrid structure, i.e. with parts made of distinct materials}
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}	33/4617	. . . {Massive or moulded cages having cage pockets surrounding the rollers, e.g. machined window cages}
33/372	. . . rigid	33/4623	. . . . {formed as one-piece cages, i.e. monoblock cages}
33/374	. . . resilient	33/4629	. . . . . {made from metal, e.g. cast or machined window cages}
33/38	. . Ball cages	33/4635	. . . . . {made from plastic, e.g. injection moulded window cages}
33/3806	. . . {Details of interaction of cage and race, e.g. retention, centring}	33/4641	. . . . . {comprising two annular parts joined together}
33/3812	. . . {formed of interconnected segments, e.g. chains}	33/4647	. . . . . {made from metal, e.g. two cast parts joined by rivets}
33/3818	. . . {formed of unconnected segments}	33/4652	. . . . . {made from plastic, e.g. two injection moulded parts joined by a snap fit}
33/3825	. . . {formed as a flexible belt, e.g. spacers connected by a thin film}	33/4658	. . . . . {comprising three annular parts, i.e. three piece roller cages}
33/3831	. . . {with hybrid structure, i.e. with parts made of distinct materials}	33/4664	. . . . . {with more than three parts, e.g. two end rings connected by individual stays}
33/3837	. . . {Massive or moulded cages having cage pockets surrounding the balls, e.g. machined window cages}	33/467	. . . {Details of individual pockets, e.g. shape or roller retaining means}
33/3843	. . . . {formed as one-piece cages, i.e. monoblock cages}	33/4676	. . . . {of the stays separating adjacent cage pockets, e.g. guide means for the bearing-surface of the rollers}
33/385	. . . . . {made from metal, e.g. cast or machined window cages}	33/4682	. . . . . {of the end walls, e.g. interaction with the end faces of the rollers}
33/3856	. . . . . {made from plastic, e.g. injection moulded window cages}	33/4688	. . . {with rolling elements with smaller diameter than the load carrying rollers, e.g. cages with counter-rotating spacers}
33/3862	. . . . . {comprising two annular parts joined together}	33/4694	. . . {Single-split roller or needle cages}
33/3868	. . . . . {made from metal, e.g. two cast parts joined by rivets}	33/48	. . . for multiple rows of rollers or needles
33/3875	. . . . . {made from plastic, e.g. two injection moulded parts joined by a snap fit}	33/485	. . . . {with two or more juxtaposed cages joined together or interacting with each other}
33/3881	. . . . . {with more than three parts, e.g. two end rings connected by individual stays}	33/49	. . . comb-shaped
33/3887	. . . {Details of individual pockets, e.g. shape or ball retaining means}	33/491	. . . . {applied as pairs for retaining both ends of the rollers or needles}
33/3893	. . . {with rolling elements with smaller diameter than the load carrying balls, e.g. cages with counter-rotating spacers}	33/492	. . . . . {joined by rods}
33/40	. . . for multiple rows of balls	33/494	. . . . {Massive or moulded comb cages}
33/405	. . . . {with two or more juxtaposed cages joined together or interacting with each other}	33/495	. . . . . {formed as one piece cages, i.e. monoblock comb cages}
33/41	. . . comb-shaped	33/497	. . . . . {made from metal, e.g. cast or machined comb cages}
33/412	. . . . {Massive or moulded comb cages, e.g. snap ball cages}	33/498	. . . . . {made from plastic, e.g. injection moulded comb cages}
33/414	. . . . . {formed as one-piece cages, i.e. monoblock comb cages}	33/50	. . . formed of interconnected members, e.g. chains
33/416	. . . . . {made from plastic, e.g. injection moulded comb cages}	33/502	. . . . {formed of arcuate segments retaining one or more rollers or needles}

33/504	. . . . . {with two segments, e.g. two semicircular cage parts}	33/6625	. . . . . {Controlling or conditioning the grease supply}
33/506	. . . . . {formed as a flexible belt}	33/6629	. . . . . {Details of distribution or circulation inside the bearing, e.g. grooves on the cage or passages in the rolling elements}
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}	33/6633	. . . . . {Grease properties or compositions, e.g. rheological properties}
33/51	. . . . . formed of unconnected members	33/6637	. . . . . {with liquid lubricant}
33/513	. . . . . {formed of arcuate segments for carrying one or more rollers}	33/664	. . . . . {Retaining the liquid in or near the bearing}
33/516	. . . . . {with two segments, e.g. double-split cages with two semicircular parts}	33/6644	. . . . . {by a magnetic field acting on a magnetic liquid}
33/52	. . . . . with no part entering between, or touching, the bearing surfaces of the rollers (F16C 33/50 takes precedence)	33/6648	. . . . . {in a porous or resinous body, e.g. a cage impregnated with the liquid}
33/523	. . . . . {with pins extending into holes or bores on the axis of the rollers}	33/6651	. . . . . {in recesses or cavities provided in retainers, races or rolling elements}
33/526	. . . . . {extending through the rollers and joining two lateral cage parts}	33/6655	. . . . . {in a reservoir in the sealing means}
33/54	. . . . . made from wire, strips, or sheet metal (F16C 33/48 , F16C 33/49 take precedence)	33/6659	. . . . . {Details of supply of the liquid to the bearing, e.g. passages or nozzles}
33/541	. . . . . {Details of individual pockets, e.g. shape or roller retaining means}	33/6662	. . . . . {the liquid being carried by air or other gases, e.g. mist lubrication}
33/542	. . . . . {made from sheet metal}	33/6666	. . . . . {from an oil bath in the bearing housing, e.g. by an oil ring or centrifugal disc}
33/543	. . . . . {from a single part}	33/667	. . . . . {related to conditioning, e.g. cooling, filtering}
33/545	. . . . . {rolled from a band}	33/6674	. . . . . {related to the amount supplied, e.g. gaps to restrict flow of the liquid}
33/546	. . . . . {with a M- or W-shaped cross section}	33/6677	. . . . . {from radial inside, e.g. via a passage through the shaft and/or inner ring}
33/547	. . . . . {from two parts, e.g. two discs or rings joined together}	33/6681	. . . . . {Details of distribution or circulation inside the bearing, e.g. grooves on the cage or passages in the rolling elements}
33/548	. . . . . {with more than three parts, e.g. two end rings connected by a plurality of stays or pins}	33/6685	. . . . . {Details of collecting or draining, e.g. returning the liquid to a sump}
33/56	. . . . . Selection of substances (F16C 33/48 , F16C 33/49 take precedence)	33/6688	. . . . . {Lubricant compositions or properties, e.g. viscosity}
33/565	. . . . . {Coatings}	33/6692	. . . . . {Liquids other than oil, e.g. water, refrigerants, liquid metal}
33/58	. . . . . Raceways; Race rings	33/6696	. . . . . {with solids as lubricant, e.g. dry coatings, powder}
33/581	. . . . . {integral with other parts, e.g. with housings or machine elements such as shafts or gear wheels}	33/72	. . . . . Sealings
33/583	. . . . . {Details of specific parts of races}	33/723	. . . . . {Shaft end sealing means, e.g. cup-shaped caps or covers}
33/585	. . . . . {of raceways, e.g. ribs to guide the rollers}	33/726	. . . . . {with means to vent the interior of the bearing}
33/586	. . . . . {outside the space between the races, e.g. end faces or bore of inner ring}	33/74	. . . . . of sliding-contact bearings
33/588	. . . . . {Races of sheet metal}	33/741	. . . . . {by means of a fluid}
33/60	. . . . . divided {or split, e.g. comprising two juxtaposed rings}	33/743	. . . . . {retained in the sealing gap}
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}	33/745	. . . . . {by capillary action}
33/61	. . . . . formed by wires	33/746	. . . . . {by a magnetic field}
33/62	. . . . . Selection of substances	33/748	. . . . . {flowing to or from the sealing gap, e.g. vacuum seals with differential exhaust}
33/64	. . . . . Special methods of manufacture	33/76	. . . . . of ball or roller bearings
33/66	. . . . . Special parts or details in view of lubrication	33/761	. . . . . {specifically for bearings with purely axial load}
33/6603	. . . . . {with grease as lubricant}	33/762	. . . . . {by means of a fluid}
33/6607	. . . . . {Retaining the grease in or near the bearing}	33/763	. . . . . {retained in the sealing gap}
33/6611	. . . . . {in a porous or resinous body, e.g. a cage impregnated with the grease}	33/765	. . . . . {by a magnetic field}
33/6614	. . . . . {in recesses or cavities provided in retainers, races or rolling elements}	33/766	. . . . . {by pumping action}
33/6618	. . . . . {in a reservoir in the sealing means}	33/767	. . . . . {integral with the race}
33/6622	. . . . . {Details of supply and/or removal of the grease, e.g. purging grease}	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}	35/047	. . . {with a base plate substantially parallel to the axis of rotation, e.g. horizontally mounted pillow blocks}
33/7806	. . . . {for spherical roller bearings}	35/06	. . Mounting {or dismounting} of ball or roller bearings; Fixing them onto shaft or in housing
33/7809	. . . . {for needle roller bearings}	35/061	. . . {mounting a plurality of bearings side by side}
33/7813	. . . . {for tapered roller bearings}	35/062	. . . {Dismounting of ball or roller bearings}
33/7816	. . . . {Details of the sealing or parts thereof, e.g. geometry, material}	35/063	. . . Fixing them on the shaft (with interposition of an element F16C 35/07)
33/782	. . . . {of the sealing region}	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}
33/7823	. . . . {of sealing lips}	35/067	. . . Fixing them in a housing (with interposition of an element F16C 35/07)
33/7826	. . . . {of the opposing surface cooperating with the seal, e.g. a shoulder surface of a bearing ring}	35/07	. . . Fixing them on the shaft or housing with interposition of an element
33/783	. . . . {of the mounting region}	35/073	. . . . between shaft and inner race ring
33/7833	. . . . {Special methods of manufacture}	35/077	. . . . between housing and outer race ring
33/7836	. . . . {floating with respect to both races}	35/078	. . . using pressure fluid as mounting aid
33/784	. . . . {mounted to a groove in the inner surface of the outer race and extending toward the inner race}	35/08	. for spindles
33/7843	. . . . {with a single annular sealing disc}	35/10	. . with sliding-contact bearings
33/7846	. . . . {with a gap between the annular disc and the inner race}	35/12	. . with ball or roller bearings {(adjustable bearings F16C 23/00 , F16C 25/00 ; elastic bearings F16C 27/00)}
33/785	. . . . {Bearing shields made of sheet metal}	37/00	Cooling of bearings
33/7853	. . . . {with one or more sealing lips to contact the inner race}	37/002	. {of fluid bearings}
33/7856	. . . . {with a single sealing lip}	37/005	. {of magnetic bearings}
33/7859	. . . . {with a further sealing element}	37/007	. {of rolling bearings}
33/7863	. . . . {mounted to the inner race, e.g. a flinger to use centrifugal effect}	39/00	Relieving load on bearings
33/7866	. . . . {with sealing lips}	39/02	. using mechanical means
33/7869	. . . . {mounted with a cylindrical portion to the inner surface of the outer race and having a radial portion extending inward}	39/04	. using hydraulic or pneumatic means
33/7873	. . . . {with a single sealing ring of generally L-shaped cross-section}	39/06	. using magnetic means
33/7876	. . . . {with sealing lips}	39/063	. . {Permanent magnets}
33/7879	. . . . {with a further sealing ring}	39/066	. . . {with opposing permanent magnets repelling each other}
33/7883	. . . . {mounted to the inner race and of generally L-shape, the two sealing rings defining a sealing with box-shaped cross-section}	41/00	Other accessories, {e.g. devices integrated in the bearing not relating to the bearing function as such}
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}	41/001	. {Integrated brakes or clutches for stopping or coupling the relatively movable parts}
33/7889	. . . . {mounted to an inner race and extending toward the outer race}	41/002	. {Conductive elements, e.g. to prevent static electricity}
33/7893	. . . . {mounted to a cage or integral therewith}	41/004	. {Electro-dynamic machines, e.g. motors, generators, actuators}
33/7896	. . . . {with two or more discrete sealings arranged in series}	41/005	. {Fluid passages not relating to lubrication or cooling}
33/80	. . . Labyrinth sealings {(F16C 33/761 takes precedence)}	41/007	. {Encoders, e.g. parts with a plurality of alternating magnetic poles}
33/805	. . . . {in addition to other sealings, e.g. dirt guards to protect sealings with sealing lips}	41/008	. {Identification means, e.g. markings, RFID-tags; Data transfer means}
33/82	. . . Arrangements for electrostatic or magnetic action against dust or other particles	41/02	. Arrangements for equalizing the load on a plurality of bearings or their elements
35/00	Rigid support of bearing units; Housings, e.g. caps, covers (F16C 23/00 takes precedence)	41/04	. Preventing damage to bearing during storage or transport thereof or when otherwise out of use
35/02	. in the case of sliding-contact bearings	41/045	. . {Devices for provisionally retaining needles or rollers in a bearing race before mounting of the bearing on a shaft}
35/04	. in the case of ball or roller bearings	43/00	Assembling bearings
35/042	. . {Housings for rolling element bearings for rotary movement}	43/02	. Assembling sliding-contact bearings
35/045	. . . {with a radial flange to mount the housing}	43/04	. Assembling rolling-contact bearings

- 43/045 . . {Mounting or replacing seals}
- 43/06 . . Placing rolling bodies in cages or bearings
- 43/065 . . . {in cages}
- 43/08 . . . by deforming the cages or the races
- 43/083 {by plastic deformation of the cage}
- 43/086 {by plastic deformation of the race}

2202/00 Solid materials defined by their properties

- 2202/02 . Mechanical properties
- 2202/04 . . Hardness
- 2202/06 . . Strength or rigidity
- 2202/08 . . Resilience, elasticity, super-elasticity
- 2202/10 . . Porosity
- 2202/20 . Thermal properties
- 2202/22 . . Coefficient of expansion
- 2202/24 . . Insulating
- 2202/28 . . Shape memory material
- 2202/30 . Electric properties; Magnetic properties
- 2202/32 . . Conductivity
- 2202/34 . . . Super-conductivity
- 2202/36 . . Piezo-electric
- 2202/40 . . Magnetic ([magnetic material in general H01F 1/00](#))
- 2202/42 . . . soft-magnetic, ferromagnetic
- 2202/44 . . . hard-magnetic, permanent magnetic, e.g. samarium-cobalt
- 2202/50 . Lubricating properties
- 2202/52 . . Graphite
- 2202/54 . . Molybdenum disulfide
- 2202/60 . Oil repelling
- 2202/64 . Water absorbing
- 2202/66 . Water repelling
- 2202/70 . Anti-bacterial, anti-microbial
- 2204/00 **Metallic materials; Alloys** ([alloys in general C22C; F16C 2206/00 takes precedence](#))
- 2204/02 . Noble metals
- 2204/04 . . based on silver
- 2204/10 . Alloys based on copper
- 2204/12 . . with tin as the next major constituent
- 2204/14 . . with zinc as the next major constituent
- 2204/16 . . with lead as the next major constituent
- 2204/18 . . with bismuth as the next major constituent
- 2204/20 . Alloys based on aluminium
- 2204/22 . . with tin as the next major constituent
- 2204/24 . . with lead as the next major constituent
- 2204/26 . Alloys based on magnesium
- 2204/30 . Alloys based on one of tin, lead, antimony, bismuth, indium, e.g. materials for providing sliding surfaces
- 2204/32 . . Alloys based on lead
- 2204/34 . . Alloys based on tin
- 2204/36 . . Alloys based on bismuth
- 2204/40 . Alloys based on refractory metals
- 2204/42 . . Alloys based on titanium
- 2204/44 . . Alloys based on chromium
- 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

2206/00 Materials with ceramics, cermets, hard carbon or similar non-metallic hard materials as main constituents

- 2206/02 . Carbon based material
- 2206/04 . . Diamond like carbon [DLC]
- 2206/06 . . Composite carbon material, e.g. carbon fibre reinforced carbon (C/C)
- 2206/40 . Ceramics, e.g. carbides, nitrides, oxides, borides of a metal
- 2206/42 . . based on ceramic oxides
- 2206/44 . . . based on aluminium oxide (Al₂O₃)
- 2206/48 . . . based on zirconia (ZrO₂)
- 2206/56 . . based on ceramic carbides, e.g. silicon carbide (SiC)
- 2206/58 . . based on ceramic nitrides
- 2206/60 . . . Silicon nitride (Si₃N₄)
- 2206/80 . Cermets, i.e. composites of ceramics and metal ([in general C22C 29/00](#))
- 2206/82 . . based on tungsten carbide [WC]

2208/00 Plastics; Synthetic resins, e.g. rubbers

- 2208/02 . comprising fillers, fibres
- 2208/04 . . Glass fibres
- 2208/10 . Elastomers; Rubbers
- 2208/12 . . Polyurethan [PU]
- 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]	2223/12	. . with carburizing
2208/70	. . Polyesters, e.g. polyethylene-terephthlate [PET], polybutylene-terephthlate [PBT]	2223/14	. . with nitriding
2208/72	. . Acrylics, e.g. polymethylmethacrylate [PMMA]	2223/16	. . with carbo-nitriding
2208/76	. . Polyolefins, e.g. polypropylene [PP]	2223/18	. . with induction hardening
2208/78	. . . Polyethylene [PE], e.g. ultra-high molecular weight polyethylene [UHMWPE]	2223/30	. Coating surfaces (in general B05C , C23C)
2208/80	. Thermosetting resins	2223/32	. . by attaching pre-existing layers, e.g. resin sheets or foils by adhesion to a substrate; Laminating (in general B32B)
2208/82	. . Composites, i.e. fibre reinforced thermosetting resins	2223/40	. . by dipping in molten material (in general C23C 2/00)
2208/86	. . Epoxy resins	2223/42	. . by spraying the coating material, e.g. plasma spraying (in general C23C 4/00)
2208/90	. . Phenolic resin	2223/44	. . by casting molten material on the substrate (in general C23C 6/00)
2210/00	Fluids	2223/46	. . by welding, e.g. by using a laser to build a layer (in general B23K 9/04)
2210/02	. defined by their properties	2223/60	. . by vapour deposition, e.g. PVD, CVD (in general C23C 14/00)
2210/04	. . by viscosity	2223/70	. . by electroplating or electrolytic coating, e.g. anodising, galvanising (in general C25D)
2210/06	. . magnetic fluids	2223/80	. . by powder coating (in general B22F 7/00)
2210/08	. molten metals	2226/00	Joining parts; Fastening; Assembling or mounting parts (fasteners, securing, joints in general F16B)
2210/10	. water based	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)
2212/00	Natural materials, i.e. based on animal or plant products such as leather, wood or cotton or extracted therefrom, e.g. lignin	2226/12	. . by press-fit, e.g. plug-in
2212/04	. Wood	2226/14	. . by shrink fit, i.e. heating and shrinking part to allow assembly (for metal parts in general B23P 11/02)
2212/08	. Woven, unwoven fabrics, e.g. felt	2226/16	. . by wedge action, e.g. by tapered or conical parts
2220/00	Shaping	2226/18	. . by magnets, i.e. magnetic attraction to hold parts together
2220/02	. by casting (in general B22D ; for plastics B29C 39/00)	2226/30	. Material joints (in general B23K)
2220/04	. . by injection-moulding (of plastics in general B29C 45/00)	2226/32	. . by soldering
2220/06	. . in-situ casting or moulding	2226/34	. . . by brazing
2220/08	. . by compression-moulding	2226/36	. . by welding
2220/20	. by sintering pulverised material, e.g. powder metallurgy (in general B22F)	2226/38	. . . with ultrasonic welding
2220/24	. by built-up welding (in general B23K 9/04)	2226/40	. . with adhesive
2220/28	. by winding impregnated fibres (in general B29C 70/00)	2226/50	. Positive connections
2220/40	. by deformation without removing material	2226/52	. . with plastic deformation, e.g. caulking or staking
2220/42	. . by working of thin walled material such as sheet or tube (in general B21D)	2226/54	. . . with rivets (in general F16B 19/00)
2220/44	. . by rolling (in general B21H)	2226/60	. . with threaded parts, e.g. bolt and nut connections (in general F16B 23/00 - F16B 43/00)
2220/46	. . by forging (in general B21J)	2226/62	. . with pins, bolts or dowels
2220/48	. . by extrusion, e.g. of metallic profiles (in general B21C 23/00)	2226/70	. . with complementary interlocking parts
2220/60	. by removing material, e.g. machining	2226/72	. . . with bayonet joints, i.e. parts are rotated to create positive interlock
2220/62	. . by turning, boring, drilling (in general B23B)	2226/74	. . . with snap-fit, e.g. by clips
2220/66	. . by milling (in general B23C)	2226/76	. . . with tongue and groove or key and slot
2220/68	. . by electrical discharge or electrochemical machining (in general B23H)	2226/78	. . . . of jigsaw-puzzle type
2220/70	. . by grinding (in general B24B)	2226/80	. . with splines, serrations or similar profiles to prevent movement between joined parts
2220/80	. by separating parts, e.g. by severing, cracking	2229/00	Setting preload
2220/82	. . by cutting (in general B26D)	2231/00	Running-in; Initial operation
2220/84	. . by perforating; by punching; by stamping-out (in general B26F)	2233/00	Monitoring condition, e.g. temperature, load, vibration
2223/00	Surface treatments; Hardening; Coating	2235/00	Cleaning
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)		

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 nano-meter 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)	2380/27	. . Motor coupled with a gear, e.g. worm gears
2340/18	. Apparatus for spinning or twisting (in general D01H)	2380/28	. . Motor, generator coupled with a flywheel
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)		