

**CPC****COOPERATIVE PATENT CLASSIFICATION****F16C****SHAFTS; FLEXIBLE SHAFTS; ELEMENTS OR CRANKSHAFT MECHANISMS; ROTARY BODIES OTHER THAN GEARING ELEMENTS; BEARINGS****NOTE**

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](#) 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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| <b>F16C 1/00</b> | <b>Flexible shafts</b> (flexible shafts in dental machines for boring or cutting <a href="#">A61C 1/18</a> ); <b>Mechanical means for transmitting movement in a flexible sheathing</b> |
| F16C 1/02        | . for conveying rotary movements  |
| F16C 1/04        | .. Articulated shafts   |
| F16C 1/06        | .. with guiding sheathing, tube or box ( <a href="#">F16C 1/04</a> takes precedence; guiding sheathings <a href="#">F16C 1/26</a> )   |
| F16C 1/08        | .. End connections  |
| F16C 1/10        | . Means for transmitting linear movement in a flexible sheathing, e.g. "Bowden-mechanisms" ( <a href="#">guiding-sheathings F16C 1/26</a> )   |
| F16C 1/101       | .. {Intermediate connectors for joining portions of split flexible shafts and/or sheathings}  |
| F16C 1/102       | .. {Arrangements to mount end fittings of the sheathings to support walls or brackets}  |
| F16C 1/103       | ... {to a hole in the wall or bracket}  |
| F16C 1/105       | ... {to a slot in the bracket}  |
| F16C 1/106       | .. {Plurality of transmitting means, e.g. two or more parallel "Bowden cables"}   |
| F16C 1/107       | .. {Sealing details}  |
| F16C 1/108       | .. {Reducing or controlling of vibrations, e.g. by resilient damping of noise}  |
| F16C 1/12        | .. Arrangements for transmitting movement to or from the flexible member  |
| F16C 1/14        | ... Construction of the end-piece of the flexible member; Attachment thereof to the flexible member   |
| F16C 1/145       | ... {Attachment of the end-piece to the flexible member}  |
| F16C 1/16        | ... in which the end-piece is guided rectilinearly  |
| F16C 1/18        | ... in which the end portion of the flexible member is laid along a curved surface of a pivoted member  |
| F16C 1/20        | .. Construction of flexible members moved to and fro in the sheathing   |
| F16C 1/205       | ... {Details of the outer surface of the flexible member, e.g. coatings}  |
| F16C 1/22        | .. Adjusting; Compensating length   |
| F16C 1/223       | ... {by adjusting the effective length of the flexible member}  |
| F16C 1/226       | ... {by adjusting the effective length of the sheathing}  |
| F16C 1/24        | . Lubrication; Lubricating equipment  |
| F16C 1/26        | . Construction of guiding-sheathings or guiding-tubes   |
| F16C 1/262       | .. {End fittings; Attachment thereof to the sheathing or tube}  |
| F16C 1/265       | ... {with a swivel tube connected to the end-fitting of a sheathing, e.g. with a spherical joint}   |
| F16C 1/267       | .. {Details of the inner surface of the sheathing or tube, e.g. coatings}   |
| F16C 1/28        | .. with built in bearings {, e.g. sheathing with rolling elements between the sheathing and the core element}   |
| <b>F16C 3/00</b> | <b>Shafts</b> (flexible shafts <a href="#">F16C 1/00</a> ; marine propeller shafts, paddle wheel shafts <a href="#">B63H 23/34</a> ); <b>Axles; Cranks; eccentrics</b>                  |
| F16C 3/02        | . Shafts; Axles   |
| F16C 3/023       | .. {made of several parts, e.g. by welding}   |

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| F16C 3/026        | .. {Shafts made of fibre reinforced resin}  |
| F16C 3/03         | .. telescopic (axially displaceable couplings <a href="#">F16D 3/06</a> )   |
| F16C 3/035        | ... with built-in bearings  |
| F16C 3/04         | . Crankshafts, eccentric-shafts; Cranks, eccentrics   |
| F16C 3/06         | .. Crankshafts  |
| F16C 3/08         | ... made in one piece (features relating to lubrication <a href="#">F16C 3/14</a> , to cooling <a href="#">F16C 3/16</a> )  |
| F16C 3/10         | ... assembled of several parts, e.g. by welding {by crimping}   |
| F16C 3/12         | .... releasably connected   |
| F16C 3/14         | ... Features relating to lubrication  |
| F16C 3/16         | ... Features relating to cooling  |
| F16C 3/18         | .. Eccentric-shafts   |
| F16C 3/20         | .. Shape of crankshafts or eccentric-shafts having regard to balancing  |
| F16C 3/22         | .. Cranks; Eccentrics (constructional features of crank-pins <a href="#">F16C 11/02</a> )   |
| F16C 3/24         | ... with return cranks, i.e. a second crank carried by the crank-pin  |
| F16C 3/26         | ... Elastic crank-webs; Resiliently-mounted crank-pins  |
| F16C 3/28         | ... Adjustable cranks or eccentrics   |
| F16C 3/30         | ... with arrangements for overcoming dead-centres   |
| <b>F16C 5/00</b>  | <b>Crossheads; Constructions of connecting-rod heads or piston-rod connections rigid with crossheads</b> (piston-rods, i.e. rods rigidly connected to the piston, <a href="#">F16J 7/00</a> )   |
| <b>F16C 7/00</b>  | <b>Connecting-rods or like links pivoted at both ends</b> (coupling-rods for locomotive driving-wheels <a href="#">B61C 17/10</a> ); <b>Construction of connecting-rod heads</b> (heads rigid with crossheads <a href="#">F16C 5/00</a> )                                 |
| F16C 7/02         | . Constructions of connecting-rods with constant length   |
| F16C 7/023        | .. {for piston engines, pumps or the like}  |
| F16C 7/026        | .. {made of fibre reinforced resin}   |
| F16C 7/04         | . with elastic intermediate part of fluid cushion   |
| F16C 7/06         | . Adjustable connecting-rods  |
| F16C 7/08         | . made from sheet metal   |
| <b>F16C 9/00</b>  | <b>Bearings for crankshafts or connecting-rods; Attachment of connecting-rods</b> (lubrication of connecting-rods in connection with crankshafts <a href="#">F16C 3/14</a> ; connections to crossheads <a href="#">F16C 5/00</a> ; to pistons <a href="#">F16J 1/14</a> ) |
| F16C 9/02         | . Crankshaft bearings   |
| F16C 9/03         | .. Arrangements for adjusting play  |
| F16C 9/04         | . Connecting-rod bearings; Attachments thereof  |
| F16C 9/045        | .. {the bearing cap of the connecting rod being split by fracturing}  |
| F16C 9/06         | .. Arrangements for adjusting play in bearings, operating either automatically or not   |
| <b>F16C 11/00</b> | <b>Pivots; Pivotal connections</b> (arrangements of steering linkage connections <a href="#">B62D 7/16</a> )  |

- F16C 11/02 . Trunnions; Crank-pins (fastening crank-pins to webs, crank-pins integral with cranks [F16C 3/06](#), [F16C 3/22](#))
- F16C 11/04 . Pivotal connections (hinges for doors, windows or wings [E05D](#))
- F16C 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](#))}
- F16C 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](#))
- F16C 11/0604 ... {Construction of the male part}
- F16C 11/0609 .... {made from two or more parts}
- F16C 11/0614 ... {the female part of the joint being open on two sides}
- F16C 11/0619 ... {the female part comprising a blind socket receiving the male part}
- F16C 11/0623 .... {Construction or details of the socket member}
- F16C 11/0628 ..... {with linings}
- F16C 11/0633 ..... {the linings being made of plastics}
- F16C 11/0638 ..... {characterised by geometrical details}
- F16C 11/0642 ..... {Special features of the plug or cover on the blind end of the socket}
- F16C 11/0647 ..... {Special features relating to adjustment for wear or play; Wear indicators}
- F16C 11/0652 ..... {combined with a damper other than elastic linings}
- F16C 11/0657 ..... {the socket member being mainly made of plastics}
- F16C 11/0661 ... {the two co-operative parts each having both convex and concave interfaces}
- F16C 11/0666 ... {Sealing means between the socket and the inner member shaft}
- F16C 11/0671 .... {allowing operative relative movement of joint parts due to flexing of the sealing means}
- F16C 11/0676 .... {allowing operational relative movement of joint parts due to sliding between parts of the sealing means}
- F16C 11/068 ... {Special features relating to lubrication}
- F16C 11/0685 ... {Manufacture of ball-joints and parts thereof, e.g. assembly of ball-joints}
- F16C 11/069 .... {with at least one separate part to retain the ball member in the socket; Quick-release systems}
- F16C 11/0695 ... {Mounting of ball-joints, e.g. fixing them to a connecting rod}
- F16C 11/08 ... with resilient bearings
- F16C 11/083 .... {by means of parts of rubber or like materials}
- F16C 11/086 ..... {with an elastomeric member in the blind end of a socket}
- F16C 11/10 .. Arrangements for locking
- F16C 11/103 ... {frictionally clamped}
- F16C 11/106 .... {for ball joints}
- F16C 11/12 .. incorporating flexible connections, e.g. leaf springs
- F16C 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**

- F16C 13/003 . {Bowed or curved rolls (rollers with a bowed axis as tentering devices for tensioning, smoothing or guiding webs [B65H 23/0258](#))}
- F16C 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}
- F16C 13/02 . Bearings
  - F16C 13/022 .. {supporting a hollow roll mantle rotating with respect to a yoke or axle}
  - F16C 13/024 ... {adjustable for positioning, e.g. radial movable bearings for controlling the deflection along the length of the roll mantle}
  - F16C 13/026 .... {by fluid pressure}
  - F16C 13/028 ..... {with a plurality of supports along the length of the roll mantle, e.g. hydraulic jacks}
- F16C 13/04 .. Bearings with only partial enclosure of the member to be borne; Bearings with local support at two or more points
- F16C 13/06 .. self-adjusting
- F16C 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](#))

- F16C 17/00** **Sliding-contact bearings for exclusively rotary movement** ([F16C 32/06](#) takes precedence; adjustable bearings [F16C 23/00](#), [F16C 25/00](#))
- F16C 17/02 . for radial load only
  - F16C 17/022 .. {with a pair of essentially semicircular bearing sleeves}
  - F16C 17/024 .. {with flexible leaves to create hydrodynamic wedge, e.g. radial foil bearings}
  - F16C 17/026 .. {with helical grooves in the bearing surface to generate hydrodynamic pressure, e.g. heringbone grooves}
  - F16C 17/028 .. {with fixed wedges to generate hydrodynamic pressure, e.g. multi-lobe bearings}
  - F16C 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](#))}
  - F16C 17/035 ... {the segments being integrally formed with, or rigidly fixed to, a support-element}
- F16C 17/04 . for axial load only
  - F16C 17/042 .. {with flexible leaves to create hydrodynamic wedge, e.g. axial foil bearings}
  - F16C 17/045 .. {with grooves in the bearing surface to generate hydrodynamic pressure, e.g. spiral groove thrust bearings}
  - F16C 17/047 .. {with fixed wedges to generate hydrodynamic pressure}
  - F16C 17/06 .. with tiltably-supported segments, e.g. Michell bearings {(with flexible leaves [F16C 17/042](#); hydrostatic [F16C 32/0666](#))}
  - F16C 17/065 ... {the segments being integrally formed with, or rigidly fixed to, a support-element}

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| F16C 17/08        | ..    | for supporting the end face of a shaft or other member, e.g. footstep bearings   |
| F16C 17/10        | .     | for both radial and axial load   |
| F16C 17/102       | ..    | {with grooves in the bearing surface to generate hydrodynamic pressure}  |
| F16C 17/105       | ...   | {with at least one bearing surface providing angular contact, e.g. conical or spherical bearing surfaces}  |
| F16C 17/107       | ...   | {with at least one surface for radial load and at least one surface for axial load}  |
| F16C 17/12        | .     | characterised by features not related to the direction of the load   |
| F16C 17/14        | ..    | specially adapted for operating in water   |
| F16C 17/18        | ..    | with floating brasses or brushing, rotatable at a reduced speed {(F16C 17/03, F16C 17/06 take precedence)}   |
| F16C 17/20        | ..    | with emergency supports or bearings  |
| F16C 17/22        | ..    | with arrangements compensating for thermal expansion   |
| F16C 17/24        | ..    | with devices affected by abnormal or undesired positions, e.g. for preventing overheating, for safety  |
| F16C 17/243       | ...   | {related to temperature and heat, e.g. for preventing overheating}   |
| F16C 17/246       | ...   | {related to wear, e.g. sensors for measuring wear}   |
| F16C 17/26        | .     | Systems consisting of a plurality of sliding-contact bearings  |
| <b>F16C 19/00</b> |       | <b>Bearings with rolling contact, for exclusively rotary movement</b> (adjustable bearings F16C 23/00, F16C 25/00; { electrically insulating bearings H02K 5/173}) |
| F16C 19/02        | .     | with bearing balls essentially of the same size in one or more circular rows   |
| F16C 19/04        | ..    | for radial load mainly   |
| F16C 19/06        | ...   | with a single row or balls   |
| F16C 19/08        | ...   | with two or more rows of balls   |
| F16C 19/10        | ..    | for axial load mainly  |
| F16C 19/12        | ...   | for supporting the end face of a shaft or other member, e.g. footstep bearings   |
| F16C 19/14        | ..    | for both radial and axial load   |
| F16C 19/16        | ...   | with a single row of balls   |
| F16C 19/163       | ....  | {with angular contact}   |
| F16C 19/166       | ..... | {Four-point-contact ball bearings}   |
| F16C 19/18        | ...   | with two or more rows of balls   |
| F16C 19/181       | ....  | {with angular contact}   |
| F16C 19/182       | ..... | {in tandem arrangement}  |
| F16C 19/183       | ..... | {with two rows at opposite angles}   |
| F16C 19/184       | ..... | {in O-arrangement}   |
| F16C 19/185       | ..... | {with two raceways provided integrally on a part other than a race ring, e.g. a shaft or housing}  |
| F16C 19/186       | ..... | {with three raceways provided integrally on parts other than race rings, e.g. third generation hubs}   |
| F16C 19/187       | ..... | {with all four raceways integrated on parts other than race rings, e.g. fourth generation hubs}  |
| F16C 19/188       | ....  | {with at least one row for radial load in combination with at least one row for axial load}  |

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| F16C 19/20    | ..    | with loose spacing bodies, e.g. balls, between the bearing balls                                     |
| F16C 19/22    | .     | with bearing rollers essentially of the same size in one or more circular rows, e.g. needle bearings |
| F16C 19/225   | ..    | {Details of the ribs supporting the end of the rollers}  |
| F16C 19/24    | ..    | for radial load mainly   |
| F16C 19/26    | ...   | with a single row of rollers   |
| F16C 19/28    | ...   | with two or more rows of rollers   |
| F16C 19/30    | ..    | for axial load mainly  |
| F16C 19/305   | ...   | {consisting of rollers held in a cage}   |
| F16C 19/32    | ...   | for supporting the end face of a shaft or other member, e.g. footstep bearings                       |
| F16C 19/34    | ..    | for both radial and axial load   |
| F16C 19/36    | ...   | with a single row of rollers   |
| F16C 19/361   | ....  | {with cylindrical rollers}   |
| F16C 19/362   | ..... | {the rollers being crossed within the single row}  |
| F16C 19/364   | ....  | {with tapered rollers, i.e. rollers having essentially the shape of a truncated cone}                |
| F16C 2019/365 | ..... | {with a single rib on the inner ring, i.e. only with an inner ring back face rib}                    |
| F16C 2019/367 | ..... | {with two ribs on the inner ring, i.e. with a front face rib and a back face rib}                    |
| F16C 2019/368 | ..... | {with a rib on the outer ring facing the large end of the rollers}                                   |
| F16C 19/38    | ...   | with two or more rows of rollers   |
| F16C 19/381   | ....  | {with at least one row for radial load in combination with at least one row for axial load}          |
| F16C 19/383   | ....  | {with tapered rollers, i.e. rollers having essentially the shape of a truncated cone}                |
| F16C 19/385   | ..... | {with two rows, i.e. double-row tapered roller bearings}   |
| F16C 19/386   | ..... | {in O-arrangement}   |
| F16C 19/388   | ..... | {with four rows, i.e. four row tapered roller bearings}  |
| F16C 19/40    | ..    | with loose spacing bodies between the rollers  |
| F16C 19/44    | ..    | Needle bearings  |
| F16C 19/46    | ...   | with one row or needles  |
| F16C 19/463   | ....  | {consisting of needle rollers held in a cage, i.e. subunit without race rings}                       |
| F16C 19/466   | ....  | {comprising needle rollers and an outer ring, i.e. subunit without inner ring}                       |
| F16C 19/48    | ...   | with two or more rows of needles   |
| F16C 19/49    | .     | Bearings with both balls and rollers   |
| F16C 19/492   | ..    | {with two or more rows with angular contact}   |
| F16C 19/495   | ...   | {with two rows}  |
| F16C 19/497   | ....  | {in O-arrangement}   |
| F16C 19/50    | .     | Other types of ball or roller bearings   |
| F16C 19/502   | ..    | {with rolling elements in rows not forming a full circle}  |



- F16C 19/505 .. {with the diameter of the rolling elements of one row differing from the diameter of those of another row}
- F16C 19/507 .. {with rolling elements journaled in one of the moving parts, e.g. stationary rollers to support a rotating part}
- F16C 19/52 . with devices affected by abnormal or undesired conditions
- F16C 19/522 .. {related to load on the bearing, e.g. bearings with load sensors or means to protect the bearing against overload}
- F16C 19/525 .. {related to temperature and heat, e.g. insulation}
- F16C 19/527 .. {related to vibration and noise}
- F16C 19/54 . Systems consisting of a plurality of bearings with rolling friction ([spindle bearings F16C 35/08](#))
- F16C 19/541 .. {Systems consisting of juxtaposed rolling bearings including at least one angular contact bearing}
  - F16C 19/542 ... {with two rolling bearings with angular contact}
  - F16C 19/543 .... {in O-arrangement}
- F16C 19/545 .. {Systems comprising at least one rolling bearing for radial load in combination with at least one rolling bearing for axial load}
- F16C 19/546 .. {Systems with spaced apart rolling bearings including at least one angular contact bearing}
  - F16C 19/547 ... {with two angular contact rolling bearings}
  - F16C 19/548 .... {in O-arrangement}
- F16C 19/55 .. with intermediate floating {or independently-driven} rings rotating at reduced speed{or with other differential ball or roller bearings}
- F16C 19/56 .. in which the rolling bodies of one bearing differ in diameter from those of another
- F16C 21/00** **Combinations of sliding-contact bearings with ball or roller bearings, for exclusively rotary movement ([F16C 17/24](#), [F16C 19/52](#) take precedence)**
- F16C 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](#))}
- F16C 23/00** **Bearings for exclusively rotary movement adjustable for aligning or positioning ([F16C 27/00](#) takes precedence; { hydrostatic bearings [F16C 32/067](#)})**
- F16C 23/02 . Sliding-contact bearings
- F16C 23/04 .. self-adjusting
  - F16C 23/041 ... {with edge relief}
  - F16C 23/043 ... {with spherical surfaces, e.g. spherical plain bearings}
    - F16C 23/045 .... {for radial load mainly, e.g. radial spherical plain bearings}
      - F16C 23/046 ..... {with split outer rings}
      - F16C 23/048 .... {for axial load mainly}
- F16C 23/06 . Ball or roller bearings
- F16C 23/08 .. self-adjusting
  - F16C 23/082 ... {by means of at least one substantially spherical surface}
    - F16C 23/084 .... {sliding on a complementary spherical surface}



- F16C 23/086 . . . . {forming a track for rolling elements}
- F16C 23/088 . . . {by means of crowning}
- F16C 23/10 . Bearings, parts of which are eccentrically adjustable with respect to each other

**F16C 25/00 Bearings for exclusively rotary movement adjustable for wear or play**  
(F16C 27/00 takes precedence)

- F16C 25/02 . Sliding-contact bearings
- F16C 25/04 . . self-adjusting
- F16C 25/045 . . . {with magnetic means to preload the bearing}
- F16C 25/06 . Ball or roller bearings
- F16C 25/08 . . self-adjusting
- F16C 25/083 . . . {with resilient means acting axially on a race ring to preload the bearing}
- F16C 25/086 . . . {with magnetic means to preload the bearing}

**F16C 27/00 Elastic or yielding bearings or bearing supports, for exclusively rotary movement** (shock-damping bearings for watches or clocks [G04B 31/02](#))

- F16C 27/02 . Sliding-contact bearings
- F16C 27/04 . Ball or roller bearings, e.g. with resilient rolling bodies
- F16C 27/045 . . {with a fluid film, e.g. squeeze film damping}
- F16C 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](#))
- F16C 27/063 . . {Sliding contact bearings}
- F16C 27/066 . . {Ball or roller bearings}
- F16C 27/08 . primarily for axial load, e.g. for vertically-arranged shafts

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

**F16C 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](#)})

- F16C 29/001 . {adjustable for alignment or positioning}
- F16C 29/002 . {Elastic or yielding linear bearings or bearing supports}
- F16C 29/004 . {Fixing of a carriage or rail, e.g. rigid mounting to a support structure or a movable part}
- F16C 29/005 . {Guide rails or tracks for a linear bearing, i.e. adapted for movement of a carriage or bearing body there along}
- F16C 29/007 . {Hybrid linear bearings, i.e. including more than one bearing type, e.g. sliding contact bearings as well as rolling contact bearings}
- F16C 29/008 . {Systems with a plurality of bearings, e.g. four carriages supporting a slide on two parallel rails}
- F16C 29/02 . Sliding-contact bearings
- F16C 29/025 . . {Hydrostatic or aerostatic (this type of bearing for rotary parts [F16C 32/06](#))}
- F16C 29/04 . Ball or roller bearings
- F16C 29/041 . . {having rollers crossed within a row}

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| F16C 29/043  | ..    | {with two massive rectangular rails having facing grooves}  |
| F16C 29/045  | ..    | {having rolling elements journaled in one of the moving parts}  |
| F16C 29/046  | ...   | {with balls journaled in pockets}   |
| F16C 29/048  | ..    | {with thin walled races, e.g. tracks of sheet metal}  |
| F16C 29/06   | ..    | in which the rolling bodies circulate partly without carrying load  |
| F16C 29/0602 | ...   | {Details of the bearing body or carriage or parts thereof, e.g. methods for manufacturing or assembly}  |
| F16C 29/0604 | ....  | {of the load bearing section}   |
| F16C 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}                                   |
| F16C 29/0609 | ....  | {of the ends of the bearing body or carriage where the rolling elements change direction, e.g. end caps}  |
| F16C 29/0611 | ....  | {of the return passages, i.e. the passages where the rolling elements do not carry load}  |
| F16C 29/0614 | ...   | {with a shoe type bearing body, e.g. a body facing one side of the guide rail or track only}  |
| F16C 29/0616 | ....  | {for supporting load essentially in a single direction}   |
| F16C 29/0619 | ..... | {with rollers or needles}   |
| F16C 29/0621 | ....  | {for supporting load in essentially two directions, e.g. by multiple points of contact or two rows of rolling elements}   |
| F16C 29/0623 | ..... | {with balls}  |
| F16C 29/0626 | ..... | {with rollers}  |
| F16C 29/0628 | ..... | {crossed within a row}  |
| F16C 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}   |
| F16C 29/0633 | ...   | {with a bearing body defining a U-shaped carriage, i.e. surrounding a guide rail or track on three sides}   |
| F16C 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} |
| F16C 29/0638 | ..... | {with balls}  |
| F16C 29/064  | ..... | {with two rows of balls, one on each side of the rail}  |
| F16C 29/0642 | ..... | {with four rows of balls}   |
| F16C 29/0645 | ..... | {with load directions in O-arrangement}   |
| F16C 29/0647 | ..... | {with load directions in X-arrangement}   |
| F16C 29/065  | ..... | {with rollers}  |
| F16C 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}                                      |
| F16C 29/0654 | ..... | {with balls}  |
| F16C 29/0657 | ..... | {with two rows of balls, one on each side of the rail}  |
| F16C 29/0659 | ..... | {with four rows of balls}   |
| F16C 29/0661 | ..... | {with load directions in O-arrangement}   |

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| F16C 29/0664      | ..... | {with load directions in X-arrangement}  |
| F16C 29/0666      | ..... | {with rollers}   |
| F16C 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 ( <a href="#">bearing shoes per se F16C 29/0614</a> )}  |
| F16C 29/0671      | ..... | {with balls}   |
| F16C 29/0673      | ..... | {with rollers}   |
| F16C 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}  |
| F16C 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 ( <a href="#">telescopic shafts with built-in bearings F16C 3/035</a> ; <a href="#">yielding coupling allowing axial displacement by rolling elements F16D 3/065</a> )} |
| F16C 29/068       | ...   | {with the bearing body fully encircling the guide rail or track}   |
| F16C 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}   |
| F16C 29/0685      | ..... | {with balls}   |
| F16C 29/0688      | ..... | {whereby a sleeve surrounds the circulating balls and thicker part of the sleeve form the load bearing tracks}   |
| F16C 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}  |
| F16C 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 ( <a href="#">telescopic shafts with built-in bearings F16C 3/035</a> ; <a href="#">yielding coupling allowing axial displacement by rolling elements F16D 3/065</a> )}                          |
| F16C 29/0695      | ..... | {with balls}   |
| F16C 29/0697      | ..... | {with polygonal guide rail or track}   |
| F16C 29/08        | .     | Arrangements for covering or protecting the ways {( <a href="#">protective coverings for parts of machine tools B23Q 11/08</a> )}  |
| F16C 29/082       | ..    | {fixed to the way}   |
| F16C 29/084       | ..    | {fixed to the carriage or bearing body movable along the guide rail or track}  |
| F16C 29/086       | ...   | {Seals being essentially U-shaped, e.g. for a U-shaped carriage}   |
| F16C 29/088       | ...   | {Seals extending in the longitudinal direction of the carriage or bearing body}  |
| F16C 29/10        | .     | Arrangements for locking the bearings  |
| F16C 29/12        | .     | Arrangements for adjusting play  |
| F16C 29/123       | ..    | {using elastic means}  |
| F16C 29/126       | ..    | {using tapered surfaces or wedges}   |
| <b>F16C 31/00</b> |       | <b>Bearings for parts which both rotate and move linearly</b>  |
| F16C 31/02        | .     | Sliding-contact bearings   |
| F16C 31/04        | .     | Ball or roller bearings  |
| F16C 31/06        | ..    | in which the rolling bodies circulate partly without carrying load   |

**F16C 32/00****Bearings not otherwise provided for**

- F16C 32/02 . Knife-edge bearings
- F16C 32/04 . using magnetic or electric supporting means
- F16C 32/0402 .. {combined with other supporting means, e.g. hybrid bearings with both magnetic and fluid supporting means}
- F16C 32/0404 .. {Electrostatic bearings}
- F16C 32/0406 .. {Magnetic bearings}
- F16C 32/0408 ... {Passive magnetic bearings}
- F16C 32/041 .... {with permanent magnets on one part attracting the other part}
- F16C 32/0412 ..... {for radial load mainly}
- F16C 32/0414 ..... {with facing axial projections}
- F16C 32/0417 ..... {for axial load mainly}
- F16C 32/0419 ..... {with facing radial projections}
- F16C 32/0421 ..... {for both radial and axial load}
- F16C 32/0423 .... {with permanent magnets on both parts repelling each other}
- F16C 32/0425 ..... {for radial load mainly}
- F16C 32/0427 ..... {for axial load mainly}
- F16C 32/0429 ..... {for both radial and axial load, e.g. conical magnets}
- F16C 32/0431 ..... {with bearings for axial load combined with bearings for radial load}
- F16C 32/0434 ..... {for parts moving linearly}
- F16C 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}
- F16C 32/0438 ..... {with a superconducting body, e.g. a body made of high temperature superconducting material such as YBaCuO}
- F16C 32/044 ... {Active magnetic bearings}
- F16C 32/0442 .... {with devices affected by abnormal, undesired or non-standard conditions such as shock-load, power outage, start-up or touchdown}
- F16C 32/0444 .... {Details of devices to control the actuation of the electromagnets}
- F16C 32/0446 ..... {Determination of the actual position of the moving member, e.g. details of sensors}
- F16C 32/0448 ..... {by using the electromagnet itself as sensor, e.g. sensorless magnetic bearings}
- F16C 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}
- F16C 32/0453 ..... {for controlling two axes, i.e. combined control of x-axis and y-axis}
- F16C 32/0455 ..... {including digital signal processing (DSP) and analog/digital conversion (A/D, D/A)}
- F16C 32/0457 ..... {Details of the power supply to the electromagnets}
- F16C 32/0459 .... {Details of the magnetic circuit}
- F16C 32/0461 ..... {of stationary parts of the magnetic circuit}
- F16C 32/0463 ..... {with electromagnetic bias, e.g. by extra bias windings}

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|--------------|-------|--|
| F16C 32/0465 | ..... | {with permanent magnets provided in the magnetic circuit of the electromagnets}  |
| F16C 32/0468 | ..... | {of moving parts of the magnetic circuit, e.g. of the rotor}   |
| F16C 32/047  | ....  | {Details of housings; Mounting of active magnetic bearings}  |
| F16C 32/0472 | ....  | {for linear movement}  |
| F16C 32/0474 | ....  | {for rotary movement}  |
| F16C 32/0476 | ..... | {with active support of one degree of freedom, e.g. axial magnetic bearings}   |
| F16C 32/0478 | ..... | {with permanent magnets to support radial load}  |
| F16C 32/048  | ..... | {with active support of two degrees of freedom, e.g. radial magnetic bearings}   |
| F16C 32/0482 | ..... | {with three electromagnets to control the two degrees of freedom}  |
| F16C 32/0485 | ..... | {with active support of three degrees of freedom}  |
| F16C 32/0487 | ..... | {with active support of four degrees of freedom}   |
| F16C 32/0489 | ..... | {with active support of five degrees of freedom, e.g. two radial magnetic bearings combined with an axial bearing}   |
| F16C 32/0491 | ..... | {with electromagnets acting in axial and radial direction, e.g. with conical magnets}  |
| F16C 32/0493 | ..... | {integrated in an electrodynamic machine, e.g. self-bearing motor}   |
| F16C 32/0495 | ..... | {generating torque and axial force}  |
| F16C 32/0497 | ..... | {generating torque and radial force}   |
| F16C 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 |
| F16C 32/0603 | ..    | {supported by a gas cushion, e.g. an air cushion}  |
| F16C 32/0607 | ...   | {the gas being retained in a gap, e.g. squeeze film bearings}  |
| F16C 32/0611 | ....  | {by means of vibrations}   |
| F16C 32/0614 | ...   | {the gas being supplied under pressure, e.g. aerostatic bearings}  |
| F16C 32/0618 | ....  | {via porous material}  |
| F16C 32/0622 | ....  | {via nozzles, restrictors}   |
| F16C 32/0625 | ....  | {via supply slits}   |
| F16C 32/0629 | ..    | {supported by a liquid cushion, e.g. oil cushion}  |
| F16C 32/0633 | ...   | {the liquid being retained in a gap}   |
| F16C 32/0637 | ....  | {by a magnetic field, e.g. ferrofluid bearings}  |
| F16C 32/064  | ...   | {the liquid being supplied under pressure}   |
| F16C 32/0644 | ....  | {Details of devices to control the supply of liquids to the bearings}  |
| F16C 32/0648 | ..... | {by sensors or pressure-responsive control devices in or near the bearings}  |
| F16C 32/0651 | ....  | {Details of the bearing area per se}   |
| F16C 32/0655 | ..... | {of supply openings}   |
| F16C 32/0659 | ..... | {of pockets or grooves}  |
| F16C 32/0662 | ..    | {Details of hydrostatic bearings independent of fluid supply or direction of load}   |
| F16C 32/0666 | ...   | {of bearing pads}  |

|              |      |   |
|--------------|------|---|
| F16C 32/067  | ...  | {of bearings adjustable for aligning, positioning, wear or play}  |
| F16C 32/0674 | .... | {by means of pre-load on the fluid bearings}  |
| F16C 32/0677 | ...  | {of elastic or yielding bearings or bearing supports}   |
| F16C 32/0681 | ..   | {Construction or mounting aspects of hydrostatic bearings, for exclusively rotary movement, related to the direction of load} |
| F16C 32/0685 | ...  | {for radial load only}  |
| F16C 32/0688 | .... | {with floating bearing elements}  |
| F16C 32/0692 | ...  | {for axial load only}   |
| F16C 32/0696 | ...  | {for both radial and axial load}  |

### **Details or accessories of bearings**

|                   |       |   |
|-------------------|-------|---|
| <b>F16C 33/00</b> |       | <b>Parts of bearings; Special methods for making bearings or parts thereof</b><br>(metal-working or like operations, see the relevant classes)  |
| F16C 33/02        | .     | Parts of sliding-contact bearings   |
| F16C 33/04        | ..    | Brasses; Bushes; linings  |
| F16C 33/043       | ...   | {Sliding surface consisting mainly of ceramics, cermets or hard carbon, e.g. diamond like carbon [DLC]}   |
| F16C 33/046       | ...   | {divided or split, e.g. half-bearings or rolled sleeves}  |
| F16C 33/06        | ...   | Sliding surface mainly made of metal ( <a href="#">F16C 33/24 to F16C 33/28 take precedence</a> ; { casting metal bearing surfaces <a href="#">B22D 15/02</a> , <a href="#">B22D 19/08</a> }) |
| F16C 33/08        | ....  | Attachment of brasses, bushes or linings to the bearing housing   |
| F16C 33/10        | ....  | Construction relative to lubrication ({ <a href="#">lubrication in general F16N</a> })  |
| F16C 33/1005      | ..... | {with gas, e.g. air, as lubricant}  |
| F16C 33/101       | ..... | {Details of the bearing surface, e.g. means to generate pressure such as lobes or wedges}   |
| F16C 33/1015      | ..... | {Pressure generating grooves}   |
| F16C 33/102       | ..... | {with grease as lubricant}  |
| F16C 33/1025      | ..... | {with liquid, e.g. oil, as lubricant}   |
| F16C 33/103       | ..... | {retained in or near the bearing}   |
| F16C 33/1035      | ..... | {by a magnetic field acting on a magnetic liquid}   |
| F16C 33/104       | ..... | {in a porous body, e.g. oil impregnated sintered sleeve}  |
| F16C 33/1045      | ..... | {Details of supply of the liquid to the bearing}  |
| F16C 33/105       | ..... | {Conditioning, e.g. metering, cooling, filtering}   |
| F16C 33/1055      | ..... | {from radial inside, e.g. via a passage through the shaft and/or inner sleeve}  |
| F16C 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}   |
| F16C 33/1065      | ..... | {Grooves on a bearing surface for distributing or collecting the liquid}  |
| F16C 33/107       | ..... | {Grooves for generating pressure}   |
| F16C 33/1075      | ..... | {Wedges, e.g. ramps or lobes, for generating pressure}  |

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| F16C 33/108  | ..... | {with a plurality of elements forming the bearing surfaces, e.g. bearing pads}  |
| F16C 33/1085 | ..... | {Channels or passages to recirculate the liquid in the bearing}   |
| F16C 33/109  | ..... | {Lubricant compositions or properties, e.g. viscosity}  |
| F16C 33/1095 | ..... | {with solids as lubricant, e.g. dry coatings, powder}   |
| F16C 33/12   | ....  | Structural composition; Use of special materials or surface treatments, e.g. for rust-proofing  |
| F16C 33/121  | ..... | {Use of special materials}  |
| F16C 33/122  | ..... | {Multilayer structures of sleeves, washers or liners}   |
| F16C 33/124  | ..... | {Details of overlays}   |
| F16C 33/125  | ..... | {Details of bearing layers, i.e. the lining}  |
| F16C 33/127  | ..... | {Details of intermediate layers, e.g. nickel dams}  |
| F16C 33/128  | ..... | {Porous bearings, e.g. bushes of sintered alloy}  |
| F16C 33/14   | ....  | Special methods of manufacture; Running-in  |
| F16C 33/145  | ..... | {of sintered porous bearings}   |
| F16C 33/16   | ...   | Sliding surface consisting mainly of graphite   |
| F16C 33/18   | ...   | Sliding surface consisting mainly of wood or fibrous material   |
| F16C 33/20   | ...   | Sliding surface consisting mainly of plastics ( <a href="#">F16C 33/22</a> to <a href="#">F16C 33/28</a> take precedence)                   |
| F16C 33/201  | ....  | {Composition of the plastic}  |
| F16C 33/203  | ....  | {Multilayer structures, e.g. sleeves comprising a plastic lining}   |
| F16C 33/205  | ..... | {with two layers}   |
| F16C 33/206  | ..... | {with three layers}   |
| F16C 33/208  | ....  | {Methods of manufacture, e.g. shaping, applying coatings}   |
| F16C 33/22   | ...   | Sliding surface consisting mainly of rubber or synthetic rubber ( <a href="#">F16C 33/24</a> to <a href="#">F16C 33/28</a> take precedence) |
| F16C 33/24   | ...   | with different areas of the sliding surface consisting of different materials   |
| F16C 33/26   | ...   | made from wire coils; made from a number of discs, rings, rods, or other members  |
| F16C 33/28   | ...   | with embedded reinforcements shaped as frames or meshed materials   |
| F16C 33/30   | .     | Parts of ball or roller bearings  |
| F16C 33/303  | ..    | {of hybrid bearings, e.g. rolling bearings with steel races and ceramic rolling elements}   |
| F16C 33/306  | ..    | {Means to synchronise movements}  |
| F16C 33/32   | ..    | Balls   |
| F16C 33/34   | ..    | Rollers; Needles  |
| F16C 33/36   | ...   | with bearing-surfaces other than cylindrical, e.g. tapered; with grooves in the bearing surfaces  |
| F16C 33/363  | ....  | {with grooves in the bearing-surfaces}  |
| F16C 33/366  | ....  | {Tapered rollers, i.e. rollers generally shaped as truncated cones}   |
| F16C 33/37   | ..    | Loose spacing bodies  |



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| F16C 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} |
| F16C 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}   |
| F16C 33/372  | ...   | rigid   |
| F16C 33/374  | ...   | resilient   |
| F16C 33/38   | ..    | Ball cages  |
| F16C 33/3806 | ...   | {Details of interaction of cage and race, e.g. retention, centring}   |
| F16C 33/3812 | ...   | {formed of interconnected segments, e.g. chains}  |
| F16C 33/3818 | ...   | {formed of unconnected segments}  |
| F16C 33/3825 | ...   | {formed as a flexible belt, e.g. spacers connected by a thin film}  |
| F16C 33/3831 | ...   | {with hybrid structure, i.e. with parts made of distinct materials}   |
| F16C 33/3837 | ...   | {Massive or moulded cages having cage pockets surrounding the balls, e.g. machined window cages}  |
| F16C 33/3843 | ....  | {formed as one-piece cages, i.e. monoblock cages}   |
| F16C 33/385  | ..... | {made from metal, e.g. cast or machined window cages}   |
| F16C 33/3856 | ..... | {made from plastic, e.g. injection moulded window cages}  |
| F16C 33/3862 | ....  | {comprising two annular parts joined together}  |
| F16C 33/3868 | ..... | {made from metal, e.g. two cast parts joined by rivets}   |
| F16C 33/3875 | ..... | {made from plastic, e.g. two injection moulded parts joined by a snap fit}  |
| F16C 33/3881 | ....  | {with more than three parts, e.g. two end rings connected by individual stays}  |
| F16C 33/3887 | ...   | {Details of individual pockets, e.g. shape or ball retaining means}   |
| F16C 33/3893 | ...   | {with rolling elements with smaller diameter than the load carrying balls, e.g. cages with counter-rotating spacers}                              |
| F16C 33/40   | ...   | for multiple rows of balls  |
| F16C 33/405  | ....  | {with two or more juxtaposed cages joined together or interacting with each other}  |
| F16C 33/41   | ...   | comb-shaped   |
| F16C 33/412  | ....  | {Massive or moulded comb cages, e.g. snap ball cages}   |
| F16C 33/414  | ..... | {formed as one-piece cages, i.e. monoblock comb cages}  |
| F16C 33/416  | ..... | {made from plastic, e.g. injection moulded comb cages}  |
| F16C 33/418  | ....  | {Details of individual pockets, e.g. shape or ball retaining means}   |
| F16C 33/42   | ...   | made from wire or sheet metal strips ( <a href="#">F16C 33/40</a> , <a href="#">F16C 33/41</a> take precedence)                                   |
| F16C 33/422  | ....  | {made from sheet metal}   |
| F16C 33/425  | ..... | {from a single part, e.g. ribbon cages with one corrugated annular part}  |
| F16C 33/427  | ..... | {from two parts, e.g. ribbon cages with two corrugated annular parts}   |
| F16C 33/44   | ...   | Selection of substances ( <a href="#">F16C 33/40</a> , <a href="#">F16C 33/41</a> take precedence)  |
| F16C 33/445  | ....  | {Coatings}  |
| F16C 33/46   | ..    | Cages for rollers or needles  |
| F16C 33/4605 | ...   | {Details of interaction of cage and race, e.g. retention or centring}   |

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| F16C 33/4611 | ...   | {with hybrid structure, i.e. with parts made of distinct materials}  |
| F16C 33/4617 | ...   | {Massive or moulded cages having cage pockets surrounding the rollers, e.g. machined window cages}   |
| F16C 33/4623 | ....  | {formed as one-piece cages, i.e. monoblock cages}  |
| F16C 33/4629 | ..... | {made from metal, e.g. cast or machined window cages}  |
| F16C 33/4635 | ..... | {made from plastic, e.g. injection moulded window cages}   |
| F16C 33/4641 | ....  | {comprising two annular parts joined together}   |
| F16C 33/4647 | ..... | {made from metal, e.g. two cast parts joined by rivets}  |
| F16C 33/4652 | ..... | {made from plastic, e.g. two injection moulded parts joined by a snap fit}   |
| F16C 33/4658 | ....  | {comprising three annular parts, i.e. three piece roller cages}  |
| F16C 33/4664 | ....  | {with more than three parts, e.g. two end rings connected by individual stays}   |
| F16C 33/467  | ...   | {Details of individual pockets, e.g. shape or roller retaining means}  |
| F16C 33/4676 | ....  | {of the stays separating adjacent cage pockets, e.g. guide means for the bearing-surface of the rollers}   |
| F16C 33/4682 | ....  | {of the end walls, e.g. interaction with the end faces of the rollers}   |
| F16C 33/4688 | ...   | {with rolling elements with smaller diameter than the load carrying rollers, e.g. cages with counter-rotating spacers}   |
| F16C 33/4694 | ...   | {Single-split roller or needle cages}  |
| F16C 33/48   | ...   | for multiple rows of rollers or needles  |
| F16C 33/485  | ....  | {with two or more juxtaposed cages joined together or interacting with each other}   |
| F16C 33/49   | ...   | comb-shaped  |
| F16C 33/491  | ....  | {applied as pairs for retaining both ends of the rollers or needles}   |
| F16C 33/492  | ..... | {joined by rods}   |
| F16C 33/494  | ....  | {Massive or moulded comb cages}  |
| F16C 33/495  | ..... | {formed as one piece cages, i.e. monoblock comb cages}   |
| F16C 33/497  | ..... | {made from metal, e.g. cast or machined comb cages}  |
| F16C 33/498  | ..... | {made from plastic, e.g. injection moulded comb cages}   |
| F16C 33/50   | ...   | formed of interconnected members, e.g. chains  |
| F16C 33/502  | ....  | {formed of arcuate segments retaining one or more rollers or needles}  |
| F16C 33/504  | ..... | {with two segments, e.g. two semicircular cage parts}  |
| F16C 33/506  | ....  | {formed as a flexible belt}  |
| F16C 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} |
| F16C 33/51   | ...   | formed of unconnected members  |
| F16C 33/513  | ....  | {formed of arcuate segments for carrying one or more rollers}  |
| F16C 33/516  | ..... | {with two segments, e.g. double-split cages with two semicircular parts}   |
| F16C 33/52   | ...   | with no part entering between, or touching, the bearing surfaces of the rollers<br>(F16C 33/50 takes precedence)   |
| F16C 33/523  | ....  | {with pins extending into holes or bores on the axis of the rollers}   |

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| F16C 33/526  | ..... | {extending through the rollers and joining two lateral cage parts}  |
| F16C 33/54   | ...   | made from wire, strips, or sheet metal ( <a href="#">F16C 33/48</a> , <a href="#">F16C 33/49</a> take precedence)   |
| F16C 33/541  | ....  | {Details of individual pockets, e.g. shape or roller retaining means}   |
| F16C 33/542  | ....  | {made from sheet metal}   |
| F16C 33/543  | ..... | {from a single part}  |
| F16C 33/545  | ..... | {rolled from a band}  |
| F16C 33/546  | ..... | {with a M- or W-shaped cross section}   |
| F16C 33/547  | ..... | {from two parts, e.g. two discs or rings joined together}   |
| F16C 33/548  | ..... | {with more than three parts, e.g. two end rings connected by a plurality of stays or pins}  |
| F16C 33/56   | ...   | Selection of substances ( <a href="#">F16C 33/48</a> , <a href="#">F16C 33/49</a> take precedence)  |
| F16C 33/565  | ....  | {Coatings}  |
| F16C 33/58   | ..    | Raceways; Race rings  |
| F16C 33/581  | ...   | {integral with other parts, e.g. with housings or machine elements such as shafts or gear wheels}   |
| F16C 33/583  | ...   | {Details of specific parts of races}  |
| F16C 33/585  | ....  | {of raceways, e.g. ribs to guide the rollers}   |
| F16C 33/586  | ....  | {outside the space between the races, e.g. end faces or bore of inner ring}   |
| F16C 33/588  | ...   | {Races of sheet metal}  |
| F16C 33/60   | ...   | divided {or split, e.g. comprising two juxtaposed rings}  |
| F16C 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} |
| F16C 33/61   | ....  | formed by wires   |
| F16C 33/62   | ...   | Selection of substances   |
| F16C 33/64   | ...   | Special methods of manufacture  |
| F16C 33/66   | ..    | Special parts or details in view of lubrication   |
| F16C 33/6603 | ...   | {with grease as lubricant}  |
| F16C 33/6607 | ....  | {Retaining the grease in or near the bearing}   |
| F16C 33/6611 | ..... | {in a porous or resinous body, e.g. a cage impregnated with the grease}   |
| F16C 33/6614 | ..... | {in recesses or cavities provided in retainers, races or rolling elements}  |
| F16C 33/6618 | ..... | {in a reservoir in the sealing means}   |
| F16C 33/6622 | ....  | {Details of supply and/or removal of the grease, e.g. purging grease}   |
| F16C 33/6625 | ..... | {Controlling or conditioning the grease supply}   |
| F16C 33/6629 | ....  | {Details of distribution or circulation inside the bearing, e.g. grooves on the cage or passages in the rolling elements}   |
| F16C 33/6633 | ....  | {Grease properties or compositions, e.g. rheological properties}  |
| F16C 33/6637 | ...   | {with liquid lubricant}   |
| F16C 33/664  | ....  | {Retaining the liquid in or near the bearing}   |
| F16C 33/6644 | ..... | {by a magnetic field acting on a magnetic liquid}   |
| F16C 33/6648 | ..... | {in a porous or resinous body, e.g. a cage impregnated with the liquid}   |

|              |            |   |
|--------------|------------|---|
| F16C 33/6651 | .....      | {in recesses or cavities provided in retainers, races or rolling elements}  |
| F16C 33/6655 | .....      | {in a reservoir in the sealing means}   |
| F16C 33/6659 | ....       | {Details of supply of the liquid to the bearing, e.g. passages or nozzles}  |
| F16C 33/6662 | .....      | {the liquid being carried by air or other gases, e.g. mist lubrication}   |
| F16C 33/6666 | .....      | {from an oil bath in the bearing housing, e.g. by an oil ring or centrifugal disc}  |
| F16C 33/667  | .....      | {related to conditioning, e.g. cooling, filtering}  |
| F16C 33/6674 | .....      | {related to the amount supplied, e.g. gaps to restrict flow of the liquid}  |
| F16C 33/6677 | .....      | {from radial inside, e.g. via a passage through the shaft and/or inner ring}  |
| F16C 33/6681 | ....       | {Details of distribution or circulation inside the bearing, e.g. grooves on the cage or passages in the rolling elements} |
| F16C 33/6685 | ....       | {Details of collecting or draining, e.g. returning the liquid to a sump}  |
| F16C 33/6688 | ....       | {Lubricant compositions or properties, e.g. viscosity}  |
| F16C 33/6692 | .....      | {Liquids other than oil, e.g. water, refrigerants, liquid metal}  |
| F16C 33/6696 | ...        | {with solids as lubricant, e.g. dry coatings, powder}   |
| F16C 33/72   | . Sealings |   |
| F16C 33/723  | ..         | {Shaft end sealing means, e.g. cup-shaped caps or covers}   |
| F16C 33/726  | ..         | {with means to vent the interior of the bearing}  |
| F16C 33/74   | ..         | of sliding-contact bearings   |
| F16C 33/741  | ...        | {by means of a fluid}   |
| F16C 33/743  | ....       | {retained in the sealing gap}   |
| F16C 33/745  | .....      | {by capillary action}   |
| F16C 33/746  | .....      | {by a magnetic field}   |
| F16C 33/748  | ....       | {flowing to or from the sealing gap, e.g. vacuum seals with differential exhaust}   |
| F16C 33/76   | ..         | of ball or roller bearings  |
| F16C 33/761  | ...        | {specifically for bearings with purely axial load}  |
| F16C 33/762  | ...        | {by means of a fluid}   |
| F16C 33/763  | ....       | {retained in the sealing gap}   |
| F16C 33/765  | .....      | {by a magnetic field}   |
| F16C 33/766  | .....      | {by pumping action}   |
| F16C 33/767  | ...        | {integral with the race}  |
| F16C 33/768  | ...        | {between relatively stationary parts, i.e. static seals}  |
| F16C 33/78   | ...        | with a diaphragm, disc, or ring, with or without resilient members {(F16C 33/761 takes precedence)}                       |
| F16C 33/7803 | ....       | {suited for particular types of rolling bearings}   |
| F16C 33/7806 | .....      | {for spherical roller bearings}   |
| F16C 33/7809 | .....      | {for needle roller bearings}  |
| F16C 33/7813 | .....      | {for tapered roller bearings}   |
| F16C 33/7816 | ....       | {Details of the sealing or parts thereof, e.g. geometry, material}  |
| F16C 33/782  | .....      | {of the sealing region}   |

|              |       |   |
|--------------|-------|---|
| F16C 33/7823 | ..... | {of sealing lips}   |
| F16C 33/7826 | ..... | {of the opposing surface cooperating with the seal, e.g. a shoulder surface of a bearing ring}                                    |
| F16C 33/783  | ..... | {of the mounting region}  |
| F16C 33/7833 | ..... | {Special methods of manufacture}  |
| F16C 33/7836 | ....  | {floating with respect to both races}   |
| F16C 33/784  | ....  | {mounted to a groove in the inner surface of the outer race and extending toward the inner race}                                  |
| F16C 33/7843 | ..... | {with a single annular sealing disc}  |
| F16C 33/7846 | ..... | {with a gap between the annular disc and the inner race}  |
| F16C 33/785  | ..... | {Bearing shields made of sheet metal}   |
| F16C 33/7853 | ..... | {with one or more sealing lips to contact the inner race}   |
| F16C 33/7856 | ..... | {with a single sealing lip}   |
| F16C 33/7859 | ..... | {with a further sealing element}  |
| F16C 33/7863 | ..... | {mounted to the inner race e.g. a flinger to use centrifugal effect}  |
| F16C 33/7866 | ..... | {with sealing lips}   |
| F16C 33/7869 | ....  | {mounted with a cylindrical portion to the inner surface of the outer race and having a radial portion extending inward}          |
| F16C 33/7873 | ..... | {with a single sealing ring of generally L-shaped cross-section}  |
| F16C 33/7876 | ..... | {with sealing lips}   |
| F16C 33/7879 | ..... | {with a further sealing ring}   |
| F16C 33/7883 | ..... | {mounted to the inner race and of generally L-shape, the two sealing rings defining a sealing with box-shaped cross-section}      |
| F16C 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} |
| F16C 33/7889 | ....  | {mounted to an inner race and extending toward the outer race}  |
| F16C 33/7893 | ....  | {mounted to a cage or integral therewith}   |
| F16C 33/7896 | ....  | {with two or more discrete sealings arranged in series}   |
| F16C 33/80   | ...   | Labyrinth sealings {(F16C 33/761 takes precedence)}   |
| F16C 33/805  | ....  | {in addition to other sealings, e.g. dirt guards to protect sealings with sealing lips}   |
| F16C 33/82   | ...   | Arrangements for electrostatic or magnetic action against dust or other particles   |

**F16C 35/00**      **Rigid support of bearing units; Housings, e.g. caps, covers** (F16C 23/00 takes precedence)

|             |     |   |
|-------------|-----|---|
| F16C 35/02  | .   | in the case of sliding-contact bearings   |
| F16C 35/04  | .   | in the case of ball or roller bearings  |
| F16C 35/042 | ..  | {Housings for rolling element bearings for rotary movement}   |
| F16C 35/045 | ... | {with a radial flange to mount the housing}   |
| F16C 35/047 | ... | {with a base plate substantially parallel to the axis of rotation, e.g. horizontally mounted pillow blocks} |
| F16C 35/06  | ..  | Mounting { or dismounting} of ball or roller bearings; Fixing them onto shaft or in housing                 |

- F16C 35/061 . . . {mounting a plurality of bearings side by side}
- F16C 35/062 . . . {Dismounting of ball or roller bearings}
- F16C 35/063 . . . Fixing them on the shaft (with interposition of an element [F16C 35/07](#))
- F16C 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}
- F16C 35/067 . . . Fixing them in a housing (with interposition of an element [F16C 35/07](#))
- F16C 35/07 . . . Fixing them on the shaft or housing with interposition of an element
- F16C 35/073 . . . . between shaft and inner race ring
- F16C 35/077 . . . . between housing and outer race ring
- F16C 35/078 . . . using pressure fluid as mounting aid
- F16C 35/08 . for spindles
- F16C 35/10 . . with sliding-contact bearings
- F16C 35/12 . . with ball or roller bearings {(adjustable bearings [F16C 23/00](#), [F16C 25/00](#); elastic bearings [F16C 27/00](#))}

**F16C 37/00****Cooling of bearings**

- F16C 37/002 . {of fluid bearings}
- F16C 37/005 . {of magnetic bearings}
- F16C 37/007 . {of rolling bearings}

**F16C 39/00****Relieving load on bearings**

- F16C 39/02 . using mechanical means
- F16C 39/04 . using hydraulic or pneumatic means
- F16C 39/06 . using magnetic means
- F16C 39/063 . . {Permanent magnets}
- F16C 39/066 . . . {with opposing permanent magnets repelling each other}

**F16C 41/00****Other accessories, { e.g. devices integrated in the bearing not relating to the bearing function as such }**

- F16C 41/001 . {Integrated brakes or clutches for stopping or coupling the relatively movable parts}
- F16C 41/002 . {Conductive elements, e.g. to prevent static electricity}
- F16C 41/004 . {Electro-dynamic machines, e.g. motors, generators, actuators}
- F16C 41/005 . {Fluid passages not relating to lubrication or cooling}
- F16C 41/007 . {Encoders, e.g. parts with a plurality of alternating magnetic poles}
- F16C 41/008 . {Identification means, e.g. markings, RFID-tags; Data transfer means}
- F16C 41/02 . Arrangements for equalizing the load on a plurality of bearings or their elements
- F16C 41/04 . Preventing damage to bearing during storage or transport thereof or when otherwise out of use
- F16C 41/045 . . {Devices for provisionally retaining needles or rollers in a bearing race before mounting of the bearing on a shaft}

**F16C 43/00****Assembling bearings**

- F16C 43/02 . Assembling sliding-contact bearings
  - F16C 43/04 . Assembling rolling-contact bearings
  - F16C 43/045 .. {Mounting or replacing seals}
  - F16C 43/06 .. Placing rolling bodies in cages or bearings
  - F16C 43/065 ... {in cages}
  - F16C 43/08 ... by deforming the cages or the races
  - F16C 43/083 .... {by plastic deformation of the cage}
  - F16C 43/086 .... {by plastic deformation of the race}
- 

## **F16C 2202/00 Solid materials defined by their properties**

- F16C 2202/02 . Mechanical properties
- F16C 2202/04 .. Hardness
- F16C 2202/06 .. Strength or rigidity
- F16C 2202/08 .. Resilience, elasticity, super-elasticity
- F16C 2202/10 .. Porosity
- F16C 2202/20 . Thermal properties
- F16C 2202/22 .. Coefficient of expansion
- F16C 2202/24 .. Insulating
- F16C 2202/28 .. Shape memory material
- F16C 2202/30 . Electric properties; Magnetic properties
- F16C 2202/32 .. Conductivity
- F16C 2202/34 ... Super-conductivity
- F16C 2202/36 .. Piezo-electric
- F16C 2202/40 .. Magnetic ([magnetic material in general H01F 1/00](#))
- F16C 2202/42 ... soft-magnetic, ferromagnetic
- F16C 2202/44 ... hard-magnetic, permanent magnetic, e.g. samarium-cobalt
- F16C 2202/50 . Lubricating properties
- F16C 2202/52 .. Graphite
- F16C 2202/54 .. Molybdenum disulfide
- F16C 2202/60 . Oil repelling
- F16C 2202/64 . Water absorbing
- F16C 2202/66 . Water repelling
- F16C 2202/70 . Anti-bacterial, anti-microbial

## **F16C 2204/00 Metallic materials; Alloys ([alloys in general C22C](#); [F16C 2206/00](#) takes precedence)**

- F16C 2204/02 . Noble metals
- F16C 2204/04 .. based on silver
- F16C 2204/10 . Alloys based on copper
- F16C 2204/12 .. with tin as the next major constituent
- F16C 2204/14 .. with zinc as the next major constituent



|                     |  |
|---------------------|--|
| F16C 2204/16        | .. with lead as the next major constituent   |
| F16C 2204/18        | .. with bismuth as the next major constituent  |
| F16C 2204/20        | . Alloys based on aluminium  |
| F16C 2204/22        | .. with tin as the next major constituent  |
| F16C 2204/24        | .. with lead as the next major constituent   |
| F16C 2204/26        | . Alloys based on magnesium  |
| F16C 2204/30        | . Alloys based on one of tin, lead, antimony, bismuth, indium, e.g. materials for providing sliding surfaces     |
| F16C 2204/32        | .. Alloys based on lead  |
| F16C 2204/34        | .. Alloys based on tin   |
| F16C 2204/36        | .. Alloys based on bismuth   |
| F16C 2204/40        | . Alloys based on refractory metals  |
| F16C 2204/42        | .. Alloys based on titanium  |
| F16C 2204/44        | .. Alloys based on chromium  |
| F16C 2204/46        | .. Alloys based on molybdenum  |
| F16C 2204/50        | . Alloys based on zinc   |
| F16C 2204/52        | . Alloys based on nickel, e.g. Inconel   |
| F16C 2204/60        | . Ferrous alloys, e.g. steel alloys  |
| F16C 2204/62        | .. Low carbon steel, i.e. carbon content below 0.4 wt%   |
| F16C 2204/64        | .. Medium carbon steel, i.e. carbon content from 0.4 to 0,8 wt%  |
| F16C 2204/66        | .. High carbon steel, i.e. carbon content above 0.8 wt%, e.g. through-hardenable steel                           |
| F16C 2204/70        | .. with chromium as the next major constituent   |
| F16C 2204/72        | ... with nickel as further constituent, e.g. stainless steel   |
| F16C 2204/74        | .. with manganese as the next major constituent  |
| F16C 2204/80        | . Amorphous alloys   |
| <b>F16C 2206/00</b> | <b>Materials with ceramics, cermets, hard carbon or similar non-metallic hard materials as main constituents</b> |
| F16C 2206/02        | . Carbon based material  |
| F16C 2206/04        | .. Diamond like carbon (DLC)   |
| F16C 2206/06        | .. Composite carbon material, e.g. carbon fibre reinforced carbon (C/C)  |
| F16C 2206/40        | . Ceramics, e.g. carbides, nitrides, oxides, borides of a metal  |
| F16C 2206/42        | .. based on ceramic oxides   |
| F16C 2206/44        | ... based on aluminium oxide ( $\text{Al}_2\text{O}_3$ )   |
| F16C 2206/48        | ... based on zirconia ( $\text{ZrO}_2$ )   |
| F16C 2206/56        | .. based on ceramic carbides, e.g. silicon carbide (SiC)   |
| F16C 2206/58        | .. based on ceramic nitrides   |
| F16C 2206/60        | ... Silicon nitride ( $\text{Si}_3\text{N}_4$ )  |
| F16C 2206/80        | . Cermets, i.e. composites of ceramics and metal ( <a href="#">in general C22C 29/00</a> )                       |
| F16C 2206/82        | .. based on tungsten carbide (WC)  |

**F16C 2208/00****Plastics; Synthetic resins, e.g. rubbers**

- F16C 2208/02 . comprising fillers, fibres
- F16C 2208/04 .. Glass fibres
- F16C 2208/10 . Elastomers; Rubbers
- F16C 2208/12 .. Polyurethan (PU)
- F16C 2208/14 .. Silicone rubber
- F16C 2208/20 . Thermoplastic resins
- F16C 2208/22 .. comprising two or more thermoplastics
- F16C 2208/30 .. Fluoropolymers ([F16C 2208/58 takes precedence](#))
- F16C 2208/32 ... Polytetrafluorethylene (PTFE) ([F16C 2208/58 takes precedence](#))
- F16C 2208/34 ... Polyvinylidene fluoride (PVDF) ([F16C 2208/58 takes precedence](#))
- F16C 2208/36 .. Polyarylene ether ketones (PAEK), e.g. PEK, PEEK ([F16C 2208/58 takes precedence](#))
- F16C 2208/40 .. Imides, e.g. polyimide (PI), polyetherimide (PEI) ([F16C 2208/58 takes precedence](#))
- F16C 2208/42 ... Polyamideimide (PAI) ([F16C 2208/58 takes precedence](#))
- F16C 2208/44 ... Polybenzimidazole (PBI) ([F16C 2208/58 takes precedence](#))
- F16C 2208/48 .. Liquid crystal polymers (LCP) ([F16C 2208/58 takes precedence](#))
- F16C 2208/52 .. Polyphenylene sulphide (PPS) ([F16C 2208/58 takes precedence](#))
- F16C 2208/54 .. Polysulphones, e.g. polysulphone (PSU), polyethersulphone (PES), polyethersulphone-block copolymer (PPSU) ([F16C 2208/58 takes precedence](#))
- F16C 2208/58 .. Several materials as provided for in [F16C 2208/30](#) to [F16C 2208/54](#) mentioned as option
- F16C 2208/60 .. Polyamides (PA)
- F16C 2208/62 ... high performance polyamides, e.g. PA12, PA46
- F16C 2208/66 .. Acetals, e.g. polyoxymethylene (POM)
- F16C 2208/70 .. Polyesters, e.g. polyethylene-terephthalate (PET), polybutylene-terephthalate (PBT)
- F16C 2208/72 .. Acrylics, e.g. polymethylmethacrylate (PMMA)
- F16C 2208/76 .. Polyolefins, e.g. polypropylene (PP)
- F16C 2208/78 ... Polyethylene (PE), e.g. ultra-high molecular weight polyethylene (UHMWPE)
- F16C 2208/80 . Thermosetting resins
- F16C 2208/82 .. Composites, i.e. fibre reinforced thermosetting resins
- F16C 2208/86 .. Epoxy resins
- F16C 2208/90 .. Phenolic resin

**F16C 2210/00****Fluids**

- F16C 2210/02 . defined by their properties
- F16C 2210/04 .. by viscosity
- F16C 2210/06 .. magnetic fluids
- F16C 2210/08 . molten metals
- F16C 2210/10 . water based

**F16C 2212/00**

**Natural materials, i.e. based on animal or plant products such as leather, wood or cotton or extracted therefrom, e.g. lignin**

F16C 2212/04

- . Wood

F16C 2212/08

- . Woven, unwoven fabrics, e.g. felt

**F16C 2220/00****Shaping**

F16C 2220/02

- . by casting ([in general B22D](#); for plastics [B29C 39/00](#))

F16C 2220/04

- .. by injection-moulding ([of plastics in general B29C 45/00](#))

F16C 2220/06

- .. in-situ casting or moulding

F16C 2220/08

- .. by compression-moulding

F16C 2220/20

- . by sintering pulverised material, e.g. powder metallurgy ([in general B22F](#))

F16C 2220/24

- . by built-up welding ([in general B23K 9/04](#))

F16C 2220/28

- . by winding impregnated fibres ([in general B29C 70/00](#))

F16C 2220/40

- . by deformation without removing material

F16C 2220/42

- .. by working of thin walled material such as sheet or tube ([in general B21D](#))

F16C 2220/44

- .. by rolling ([in general B21H](#))

F16C 2220/46

- .. by forging ([in general B21J](#))

F16C 2220/48

- .. by extrusion, e.g. of metallic profiles ([in general B21C 23/00](#))

F16C 2220/60

- . by removing material, e.g. machining

F16C 2220/62

- .. by turning, boring, drilling ([in general B23B](#))

F16C 2220/66

- .. by milling ([in general B23C](#))

F16C 2220/68

- .. by electrical discharge or electrochemical machining ([in general B23H](#))

F16C 2220/70

- .. by grinding ([in general B24B](#))

F16C 2220/80

- . by separating parts, e.g. by severing, cracking

F16C 2220/82

- .. by cutting ([in general B26D](#))

F16C 2220/84

- .. by perforating; by punching; by stamping-out ([in general B26F](#))

**F16C 2223/00****Surface treatments; Hardening; Coating**

F16C 2223/02

- . Mechanical treatment, e.g. finishing

F16C 2223/04

- .. by sizing, by shaping to final size by small plastic deformation, e.g. by calibrating or coining ([in general B23P 9/00](#))

F16C 2223/06

- .. polishing ([in general B24B 29/00](#), [B24B 31/00](#))

F16C 2223/08

- .. shot-peening, blasting ([in general B24C](#))

F16C 2223/10

- . Hardening, e.g. carburizing, carbo-nitriding ([in general C21D](#), [C23C 8/00](#))

F16C 2223/12

- .. with carburizing

F16C 2223/14

- .. with nitriding

F16C 2223/16

- .. with carbo-nitriding

F16C 2223/18

- .. with induction hardening

F16C 2223/30

- . Coating surfaces ([in general B05C](#), [C23C](#))

F16C 2223/32

- .. by attaching pre-existing layers, e.g. resin sheets or foils by adhesion to a substrate; Laminating ([in general B32B](#))

|                     |  |
|---------------------|--|
| F16C 2223/40        | .. by dipping in molten material ( <a href="#">in general C23C 2/00</a> )  |
| F16C 2223/42        | .. by spraying the coating material, e.g. plasma spraying ( <a href="#">in general C23C 4/00</a> )   |
| F16C 2223/44        | .. by casting molten material on the substrate ( <a href="#">in general C23C 6/00</a> )  |
| F16C 2223/46        | .. by welding, e.g. by using a laser to build a layer ( <a href="#">in general B23K 9/04</a> )   |
| F16C 2223/60        | .. by vapour deposition, e.g. PVD, CVD ( <a href="#">in general C23C 14/00</a> )   |
| F16C 2223/70        | .. by electroplating or electrolytic coating, e.g. anodising, galvanising ( <a href="#">in general C25D</a> )  |
| F16C 2223/80        | .. by powder coating ( <a href="#">in general B22F 7/00</a> )  |
| <b>F16C 2226/00</b> | <b>Joining parts; Fastening; Assembling or mounting parts (fasteners, securing, joints in general <a href="#">F16B</a>)</b>  |
| F16C 2226/10        | . Force connections, e.g. clamping ( <a href="#">shrinkage connections, force fits, friction grips in general F16B 4/00</a> , <a href="#">for rigidly connecting coaxial parts F16D 1/00</a> ) |
| F16C 2226/12        | .. by press-fit, e.g. plug-in  |
| F16C 2226/14        | .. by shrink fit, i.e. heating and shrinking part to allow assembly ( <a href="#">for metal parts in general B23P 11/02</a> )  |
| F16C 2226/16        | .. by wedge action, e.g. by tapered or conical parts   |
| F16C 2226/18        | .. by magnets, i.e. magnetic attraction to hold parts together   |
| F16C 2226/30        | . Material joints ( <a href="#">in general B23K</a> )  |
| F16C 2226/32        | .. by soldering  |
| F16C 2226/34        | ... by brazing   |
| F16C 2226/36        | .. by welding  |
| F16C 2226/38        | ... with ultrasonic welding  |
| F16C 2226/40        | .. with adhesive   |
| F16C 2226/50        | . Positive connections   |
| F16C 2226/52        | .. with plastic deformation, e.g. caulking or staking  |
| F16C 2226/54        | ... with rivets ( <a href="#">in general F16B 19/00</a> )  |
| F16C 2226/60        | .. with threaded parts, e.g. bolt and nut connections ( <a href="#">in general F16B 23/00 to F16B 43/00</a> )  |
| F16C 2226/62        | .. with pins, bolts or dowels  |
| F16C 2226/70        | .. with complementary interlocking parts   |
| F16C 2226/72        | ... with bayonet joints, i.e. parts are rotated to create positive interlock   |
| F16C 2226/74        | ... with snap-fit, e.g. by clips   |
| F16C 2226/76        | ... with tongue and groove or key and slot   |
| F16C 2226/78        | .... of jigsaw-puzzle type   |
| F16C 2226/80        | .. with splines, serrations or similar profiles to prevent movement between joined parts   |
| <b>F16C 2229/00</b> | <b>Setting preload</b>   |
| <b>F16C 2231/00</b> | <b>Running-in; Initial operation</b>   |
| <b>F16C 2233/00</b> | <b>Monitoring condition, e.g. temperature, load, vibration</b>   |

|                     |  |
|---------------------|--|
| <b>F16C 2235/00</b> | <b>Cleaning</b>  |
| <b>F16C 2237/00</b> | <b>Repair or replacement</b>   |
| <b>F16C 2240/00</b> | <b>Specified values or numerical ranges of parameters; Relations between them</b><br>(properties of materials <a href="#">F16C 2202/00</a> ) |
| F16C 2240/02        | . Flow, e.g. volume flow or mass flow  |
| F16C 2240/06        | . Temperature  |
| F16C 2240/08        | . Time   |
| F16C 2240/12        | . Force, load, stress, pressure  |
| F16C 2240/14        | .. Preload   |
| F16C 2240/18        | .. Stress  |
| F16C 2240/22        | .. Fluid pressure  |
| F16C 2240/26        | . Speed, e.g. rotational speed   |
| F16C 2240/30        | . Angles, e.g. inclinations  |
| F16C 2240/34        | .. Contact angles  |
| F16C 2240/40        | . Linear dimensions, e.g. length, radius, thickness, gap   |
| F16C 2240/42        | .. Groove sizes  |
| F16C 2240/44        | .. Hole or pocket sizes  |
| F16C 2240/46        | .. Gap sizes or clearances   |
| F16C 2240/48        | .. Particle sizes  |
| F16C 2240/50        | .. Crowning, e.g. crowning height or crowning radius   |
| F16C 2240/54        | .. Surface roughness   |
| F16C 2240/56        | .. Tolerances; Accuracy of linear dimensions   |
| F16C 2240/60        | .. Thickness, e.g. thickness of coatings   |
| F16C 2240/64        | ... in the nano-meter range  |
| F16C 2240/70        | .. Diameters; Radii  |
| F16C 2240/76        | ... Osculation, i.e. relation between radii of balls and raceway groove  |
| F16C 2240/80        | ... Pitch circle diameters (PCD)   |
| F16C 2240/82        | .... Degree of filling, i.e. sum of diameters of rolling elements in relation to PCD   |
| F16C 2240/84        | ..... with full complement of balls or rollers, i.e. sum of clearances less than diameter of one rolling element                             |
| F16C 2240/90        | . Surface areas  |
| F16C 2240/94        | . Volume   |
| <b>F16C 2300/00</b> | <b>Application independent of particular apparatuses</b>   |
| F16C 2300/02        | . General use or purpose, i.e. no use, purpose, special adaptation or modification indicated or a wide variety of uses mentioned             |
| F16C 2300/10        | . related to size  |
| F16C 2300/12        | .. Small applications, e.g. miniature bearings   |
| F16C 2300/14        | .. Large applications, e.g. bearings having an inner diameter exceeding 500 mm   |

- F16C 2300/20 . related to type of movement
- F16C 2300/22 . . High-speed rotation
- F16C 2300/28 . . Reciprocating movement
- F16C 2300/30 . related to direction with respect to gravity
- F16C 2300/32 . . Horizontal, e.g. bearings for supporting a horizontal shaft
- F16C 2300/34 . . Vertical, e.g. bearings for supporting a vertical shaft
- F16C 2300/40 . related to environment, i.e. operating conditions
- F16C 2300/42 . . corrosive, i.e. with aggressive media or harsh conditions
- F16C 2300/52 . . low temperature, e.g. cryogenic temperature
- F16C 2300/54 . . high-temperature
- F16C 2300/62 . . low pressure, e.g. elements operating under vacuum conditions
- F16C 2300/64 . . high pressure, e.g. elements exposed to high pressure gases or fluids

**F16C 2310/00** **Agricultural machines** (in general [A01](#))

**F16C 2314/00** **Personal or domestic articles, e.g. household appliances such as washing machines, dryers** (in general [A41](#) to [A47](#))

- F16C 2314/70 . Furniture
- F16C 2314/72 . . Drawers
- F16C 2314/73 . . Chairs

**F16C 2316/00** **Apparatus in health or amusement** (in general [A61](#) to [A63](#))

- F16C 2316/10 . in medical appliances, e.g. in diagnosis, dentistry, instruments, prostheses, medical imaging appliances
- F16C 2316/13 . . Dental machines
- F16C 2316/18 . . Pumps for pumping blood
- F16C 2316/30 . Articles for sports, games and amusement, e.g. roller skates, toys

**F16C 2320/00** **Apparatus used in separating or mixing** (in general [B01](#) to [B09](#))

- F16C 2320/16 . Mixing apparatus
- F16C 2320/23 . Milling apparatus (in general [B02C](#))
- F16C 2320/42 . Centrifuges (in general [B04B](#))

**F16C 2322/00** **Apparatus used in shaping articles** (in general [B21](#) to [B32](#))

- F16C 2322/12 . Rolling apparatus, e.g. rolling stands, rolls
- F16C 2322/14 . Stamping, deep-drawing or punching, e.g. die sets
- F16C 2322/34 . Sawing machines (in general [B23D](#))
- F16C 2322/39 . General build up of machine tools, e.g. spindles, slides, actuators (in general [B23Q](#))
- F16C 2322/50 . Hand tools, workshop equipment or manipulators (in general [B25](#))
- F16C 2322/59 . . Manipulators, e.g. robot arms (in general [B25J](#))

**F16C 2324/00** **Apparatus used in printing** (in general [B41](#) to [B44](#))

- F16C 2324/16 . Printing machines (in general [B41F](#))

**F16C 2326/00**

F16C 2326/01

F16C 2326/02

F16C 2326/05

F16C 2326/06

F16C 2326/08

F16C 2326/09

F16C 2326/10

F16C 2326/20

F16C 2326/24

F16C 2326/26

F16C 2326/28

F16C 2326/30

F16C 2326/43

F16C 2326/47

F16C 2326/58

**Articles relating to transporting (in general [B60](#) to [B68](#))**

- . Parts of vehicles in general ([engines F16C 2360/00](#))
- .. Wheel hubs or castors ([in general B60B](#))
- .. Vehicle suspensions, e.g. bearings, pivots or connecting rods used therein ([in general B60G](#))
- .. Drive shafts ([in general B60K](#))
- .. Vehicle seats, e.g. in linear movable seats ([in general B60N](#))
- .. Windscreen wipers, e.g. pivots therefore ([in general B60S](#))
- . Railway vehicles ([in general B61](#))
- . Land vehicles ([in general B62](#))
- .. Steering systems, e.g. steering rods or columns ([in general B62D](#))
- .. Bicycle steering or suspension ([in general B62K](#))
- .. Bicycle propulsion, e.g. crankshaft and its support ([in general B62M](#))
- . Ships, e.g. propelling shafts and bearings therefor ([in general B63H](#))
- . Aeroplanes; Helicopters ([in general B64C](#))
- . Cosmonautic vehicles, i.e. bearings adapted for use in outer-space ([in general B64G](#))
- . Conveyer systems, e.g. rollers or bearings therefor ([in general B65G](#))

**F16C 2340/00**

F16C 2340/18

F16C 2340/24

**Apparatus for treating textiles (in general [D01](#) to [D07](#))**

- . Apparatus for spinning or twisting ([in general D01H](#))
- . Godet rolls ([in general D02](#))

**F16C 2350/00**

F16C 2350/26

F16C 2350/52

F16C 2350/54

**Machines or articles related to building (in general [E01](#) to [E06](#))**

- . Excavators ([in general E02F](#))
- . Locks, e.g. cables to actuate door locks ([in general E05B](#))
- . Hinges, e.g. sliding bearings for hinges ([in general E05D](#))

**F16C 2352/00****Apparatus for drilling (in general [E21](#))****F16C 2360/00**

F16C 2360/18

F16C 2360/22

F16C 2360/23

F16C 2360/24

F16C 2360/31

F16C 2360/42

F16C 2360/43

F16C 2360/44

F16C 2360/45

F16C 2360/46

**Engines or pumps (in general [F01](#) to [F04](#))**

- . Camshafts ([in general F01L](#))
- . Internal combustion engines ([in general F02B](#))
- . Gas turbine engines ([in general F02C](#))
- .. Turbochargers ([in general F02C 6/12](#))
- . Wind motors ([in general F03D](#))
- . Pumps with cylinders or pistons ([in general F04B](#))
- . Screw compressors ([in general F04C](#))
- . Centrifugal pumps ([in general F04D](#))
- .. Turbo-molecular pumps ([in general F04D 19/04](#))
- . Fans, e.g. ventilators

**F16C 2361/00****Apparatus or articles in engineering in general ([F15](#) to [F17](#))**



|                     |   |
|---------------------|---|
| F16C 2361/31        | . Axle  |
| F16C 2361/41        | . Couplings (in general <a href="#">F16D 3/00</a> )   |
| F16C 2361/43        | . Clutches, e.g. disengaging bearing (in general <a href="#">F16D 11/00</a> to <a href="#">F16D 47/00</a> )                 |
| F16C 2361/45        | . Brakes (in general <a href="#">B60T</a> , <a href="#">F16D 49/00</a> to <a href="#">F16D 65/00</a> )                      |
| F16C 2361/53        | . Spring-damper, e.g. gas springs (in general <a href="#">F16F 9/00</a> )   |
| F16C 2361/55        | . Flywheel systems (in general <a href="#">F16F 15/00</a> )   |
| F16C 2361/61        | . Toothed gear systems, e.g. support of pinion shafts (in general <a href="#">F16H 57/02</a> )                              |
| F16C 2361/63        | . Gears with belts and pulleys  |
| F16C 2361/65        | . Gear shifting, change speed gear, gear box  |
| F16C 2361/71        | . Chains (in general <a href="#">F16G</a> )   |
| F16C 2361/91        | . Valves  |
| <b>F16C 2362/00</b> | <b>Apparatus for lighting or heating (in general <a href="#">F21</a> to <a href="#">F28</a>)</b>                            |
| F16C 2362/40        | . Ovens or other heatings (in general <a href="#">F24</a> )   |
| F16C 2362/52        | . Compressors of refrigerators, e.g. air-conditioners (in general <a href="#">F25</a> )                                     |
| <b>F16C 2370/00</b> | <b>Apparatus relating to physics, e.g. instruments (in general <a href="#">G01</a> to <a href="#">G12</a>)</b>              |
| F16C 2370/12        | . Hard disk drives or the like  |
| F16C 2370/20        | . Optical, e.g. movable lenses or mirrors; Spectacles (in general <a href="#">G02</a> )                                     |
| F16C 2370/22        | . . Polygon mirror  |
| F16C 2370/38        | . Electrographic apparatus (in general <a href="#">G03G</a> )   |
| <b>F16C 2380/00</b> | <b>Electrical apparatus (in general <a href="#">H01</a> to <a href="#">H05</a>)</b>   |
| F16C 2380/16        | . X-ray tubes (in general <a href="#">H01J 35/00</a> )  |
| F16C 2380/18        | . Handling tools for semiconductor devices  |
| F16C 2380/26        | . Dynamo-electric machines or combinations therewith, e.g. electro-motors and generators (in general <a href="#">H02K</a> ) |
| F16C 2380/27        | . . Motor coupled with a gear, e.g. worm gears  |
| F16C 2380/28        | . . Motor, generator coupled with a flywheel  |