ECLA EUROPEAN CLASSIFICATION

F16H GEARING [N: (steering of motor vehicles by differentially driving ground-engaging elements on opposite vehicle sides B62D11/02)]

[N: **WARNING** [C2012.02]
1. The following IPC groups are not used in the internal ECLA classification system. Subject matter covered by these groups is classified in the following ECLA groups:

F16H48/00 covered by F16H1/38;
F16H48/02 covered by B60K;
F16H48/04 covered by B60K;
F16H48/06 covered by F16H1/38;
F16H48/08 covered by F16H1/40;
F16H48/10 covered by F16H1/42;
F16H48/12 covered by F16H35/04;
F16H48/14 covered by F16H35/04C;
F16H48/16 covered by F16H35/04, F16H41/00;
F16H48/18 covered by F16H39/40;
F16H48/20 covered by F16H1/44;
F16H48/22 covered by F16H1/44;
F16H48/24 covered by F16H1/44;
F16H48/26 covered by F16H1/45S;
F16H48/28 covered by F16H1/45, F16H1/45B, F16H1/45C;
F16H48/30 covered by F16H1/44S.
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Notes[N0904]
1. Combinations including mechanical gearings are classified in groups F16H37/00 or F16H47/00, unless they are provided for in groups F16H1/00 to F16H35/00.
2. In this subclass, sets of rigidly-connected members are regarded as single members.
3. In this subclass, the following terms or expressions are used with the meanings indicated:
- "toothed gearing" includes worm gearing and other gearing involving at least one wheel or sector provided with teeth or the equivalent, EXCEPT gearing with chains or toothed belts, which is treated as friction gearing;
- "conveying motion" includes transmitting energy, and means that the applied and resultant motions are of the same kind, though they may differ in, e.g. speed, direction extent:
- "rotary" implies that the motion may continue indefinitely;
- "oscillating" means moving about an axis to an extent which is limited by the construction of the gearing, and which may exceed one revolution, the movement being alternately forwards and backwards during continued operation of the gearing;
- "reciprocating" means moving substantially in a straight line, the movement being alternately forwards and backwards during continued operation of the gearing;
- "reversing" or "reversal" means that an applied movement in one direction may produce a resultant movement in either of two opposed directions at will;
- "central gears" includes any gears whose axis is the main axis of the gearing. Attention is drawn to the following places:

A01D69/06 Gearings in harvesting machines
A63H31/00 Gearing for toys
B21B35/12 Toothed-weel gearing for metal-rolling mills
B60K Arrangement of transmissions in vehicles

B61C9/00	Transmissions for railway locomotives
B62D3/00	Vehicle steering gears
B62M	Transmissions for cycles
B63H23/00	Transmissions for marine propulsions
B63H25/00	Marine steering gears
[N: B64C27/12, B64C27/58	Transmissions for helicopters
B64D35/00	Transmissions for aircraft]
F01 to F04	Machines, engines, pumps
F15B15/00	Gearings associated with fluid-actuated devices
G01D5/04	Gearing used in indicating or recording apparatus in connection with measuring devices
H03J1/00	Driving arrangements for tuning resonant circuits
H04L13/04	Driving mechanisms for apparatus for transmission of coded digital information.

Guide heading: **Toothed gearings for conveying rotary motion**

F16H1/00 **Toothed gearings for conveying rotary motion** (specific for conveying rotary motion with variable gear ratio or for reversing rotary motion F16H3/00)

F16H1/00B . [N: Monodirectionally torque-transmitting toothed gearing]

F16H1/00C . [N: the driving and driven axes being designed to assume variable positions relative to one another during operation]

F16H1/02 . without gears having orbital motion

F16H1/04 . . involving only two intermeshing members

F16H1/06 . . . with parallel axes

F16H1/08 . . . . the members having helical, herringbone, or like teeth

F16H1/10 . . . . one of the members being internally toothed

F16H1/12 . . . with non-parallel axes

F16H1/12B . . . . [N: comprising spiral gears]

F16H1/14 . . . . comprising conical gears only

F16H1/14B . . . . . [N: with offset axes, e.g. hypoïd gearings]

F16H1/16 . . . . comprising worm and worm-wheel

F16H1/16B . . . . . [N: with balls between the co-operating parts]

F16H1/16C . . . . . [N: with members rotating around axes on the worm or worm-wheel]

F16H1/18 . . . . the members having helical, herringbone, or like teeth (F16H1/14 takes precedence)

F16H1/20 . . involving more than two intermeshing members

F16H1/20B . . . [N: with non-parallel axes (F16H1/22 takes precedence)]

F16H1/20C . . . [N: characterised by the driving or driven member being composed of two or more gear wheels]

F16H1/22 . . . with a plurality of driving or driven shafts; with arrangements for dividing torque between two or more intermediate shafts

F16H1/22B . . . . [N: with non-parallel axes]

F16H1/22B1 . . . . . [N: with two or more worm and worm-wheel gearings]

F16H1/22C . . . . [N: comprising two or more gearwheels in mesh with the same internally toothed wheel]

F16H1/24 . . involving gears essentially having intermeshing elements other than involute or cycloidal teeth (F16H1/16 takes precedence)

F16H1/26 . . Special means compensating for misalignment of axes

F16H1/28 . with gears having orbital motion

F16H1/28B . . [N: with means for equalising the distribution of load on the planet-wheels]

F16H1/28B1 . . . [N: by allowing limited movement of the ring gear relative to the casing or shaft]

F16H1/28B2 . . . [N: by allowing limited movement of the planet carrier, e.g. relative to its shaft]

F16H1/28B3 . . . [N: by allowing limited movement of the planets relative to the planet carrier or by using free floating planets]

F16H1/28B4 . . . [N: by allowing limited movement of the sun gear]

F16H1/28C . . [N: involving conical gears]

F16H1/28D . . [N: Arrangements for adjusting or for taking-up backlash]

F16H1/30 . . in which an orbital gear has an axis crossing the main axes of the gearing and has helical teeth or is a worm

F16H1/32 . . in which the central axis of the gearing lies inside the periphery of an orbital gear

F16H1/32B . . . [N: the orbital gear being nutating]

F16H1/34 . . involving gears essentially having intermeshing elements other than involute or cycloidal teeth (in worm gearing F16H1/30)

F16H1/36 . . with two central gears coupled by intermeshing orbital gears

F16H1/46 . . Systems consisting of a plurality of gear trains each with orbital gears, [N: i.e. systems having three or more central gears] [C9608]

F16H1/48 . . Special means compensating for misalignment of axes [N: e.g. for equalising distribution of load on the face width of the teeth (in combination with distribution of load on the planet-wheels F16H1/28B)]

F16H3/00 **Toothed gearings for conveying rotary motion with variable gear ratio or for reversing rotary motion** (speed-changing or reversing mechanisms F16H59/00 to F16H63/00)

F16H3/00B . [N: convertible for varying the gear-ratio, e.g. for selecting one of several shafts as the input shaft]

F16H3/00C . [N: using gears having teeth movable out of mesh (F16H3/42 takes precedence)]

F16H3/00D . [N: the gear-ratio being changed by inversion of torque direction]

F16H3/00D1 . . [N: for gearings using gears having orbital motion]

F16H3/00F . [N: power being selectively transmitted by either one of the parallel flow paths]

F16H3/02 . without gears having orbital motion

F16H3/04 . . with internally-toothed gears

F16H3/06 . . with worm and worm-wheel or gears essentially having helical or herring-bone teeth

Note
In groups F16H3/08, F16H3/16 and F16H3/20, gears which can be put out of mesh are not taken into consideration if they are used for reversal only.

F16H3/08 . . exclusively or essentially with continuously meshing gears, that can be disengaged from their shafts

F16H3/083 . . . with radially acting and axially controlled clutching members, e.g. sliding keys [N: (clutches with clutching members movable otherwise than only axially F16D11/12; clutches with wedgeable clutching members F16D15/00; systems of mechanically actuated clutches F16D21/04)]

F16H3/085 . . . with more than one output shaft

F16H3/087 . . . characterised by the disposition of the gears (F16H3/083, F16H3/085 take precedence)

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

F16H3/089 . . . . all of the meshing gears being supported by a pair of parallel shafts, one being the input shaft and the other the output shaft, there being no countershaft involved

F16H3/091 . . . . including a single countershaft

F16H3/091B . . . . . [N: with coaxial input and output shafts]

F16H3/093 . . . . with two or more countershafts

F16H3/095 . . . . . with means for ensuring an even distribution of torque between the countershafts

F16H3/097 . . . . . the input and output shafts being aligned on the same axis [N0704]

F16H3/10 . . . with one or more one-way clutches as an essential feature

F16H3/12 . . . with means for synchronisation not incorporated in the clutches (synchronised clutches F16D23/02)

F16H3/12E . . . . [N: using an electric drive] [N0202]

F16H3/14 . . . Gearings for reversal only

F16H3/14B . . . . [N: with a pair of coaxial bevel gears, rotatable in opposite directions]

F16H3/16 . . essentially with both gears that can be put out of gear and continuously-meshing gears that can be disengaged from their shafts

F16H3/18 . . . Gearings for reversal only

F16H3/20 . . exclusively or essentially using gears that can be moved out of gear

F16H3/22 . . . with gears shiftable only axially

F16H3/24 . . . . with driving and driven shafts coaxial

F16H3/26 . . . . . and two or more additional shafts

F16H3/28 . . . . . an additional shaft being coaxial with the main shafts

F16H3/30 . . . . with driving and driven shafts not coaxial

F16H3/32 . . . . . and an additional shaft

F16H3/34 . . . with gears shiftable otherwise than only axially

F16H3/36 . . . with a single gear meshable with any of a set of coaxial gears of different diameters

F16H3/36B . . . . [N: the teeth of the set of coaxial gears being arranged on a surface of generally conical shape]

F16H3/36C . . . . [N: the teeth of the set of coaxial gears being arranged on a generally flat,

e.g. disc-type, surface]

F16H3/38 . . . with synchro-meshing

F16H3/38B . . . . [N: with braking means (constructional features of the final output mechanisms for reversing F16H63/30G)] [C0704]

F16H3/40 . . . Gearings for reversal only

F16H3/42 . . with gears having teeth formed or arranged for obtaining multiple gear ratios, e.g. nearly infinitely variable

F16H3/42B . . . [N: the teeth being arranged on a surface of generally conical shape]

F16H3/42C . . . [N: the teeth being arranged on a generally flat, e.g. disc-type surface]

F16H3/44 . using gears having orbital motion [N: (the gear-ratio being changed by inversion of torque direction F16H3/00D1)]

F16H3/46 . . Gearings having only two central gears, connected by orbital gears (F16H3/68 to F16H3/78 take precedence)

F16H3/48 . . . with single orbital gears or pairs or rigidly-connected orbital gears

F16H3/50 . . . . comprising orbital conical gears

F16H3/52 . . . . comprising orbital spur gears

F16H3/54 . . . . . one of the central gears being internally toothed and the other externally toothed

F16H3/56 . . . . . both central gears being sun gears

F16H3/58 . . . with sets of orbital gears, each consisting of two or more intermeshing orbital gears

F16H3/60 . . . Gearings for reversal only

Note
In groups F16H3/62 to F16H3/66B the following COPES codes may be used:

K : Use of conical gears.

F16H3/62 . . Gearings having three or more central gears (F16H3/68 to F16H3/78 take precedence)

F16H3/64 . . . composed of a number of gear trains, the drive always passing through all the trains, each train having not more than one connection for driving another train

F16H3/66 . . . composed of a number of gear trains without drive passing from one train to another

F16H3/66B . . . . [N: with conveying rotary motion between axially spaced orbital gears, e.g. RAVIGNEAUX]

F16H3/66C . . . . [N: with compound planetary gear units, e.g. two intermeshing orbital gears (F16H3/66B takes precedence)]

F16H3/68 . . in which an orbital gear has an axis crossing the main axis of the gearing and has helical teeth or is a worm

F16H3/70 . . in which the central axis of the gearing lies inside the periphery of an orbital gear

F16H3/72 . . with a secondary drive, e.g. regulating motor, in order to vary speed continuously

F16H3/72B . . . [N: with an energy dissipating device, e.g. regulating brake or fluid throttle, in order to vary speed continuously]

F16H3/72B1 . . . . [N: with a fluid throttle]

F16H3/72E . . . [N: using external powered electric machines] [N0202]

F16H3/72E2 . . . . [N: with means to change ratio in the mechanical gearing] [N0202]

F16H3/72G . . . [N: with at least two dynamo electric machines for creating an electric power path inside the gearing, e.g. using generator and motor for a variable power torque path (special adapted for a hybrid electric vehicle B60K6/04)] [N0202]

F16H3/72G2 . . . . [N: with means to change ratio in the mechanical gearing] [N0202]

F16H3/74 . . Complexes, not using actuable speedchanging or regulating members, e.g. with gear ratio determined by free play of frictional or other forces

F16H3/76 . . with an orbital gear having teeth formed or arranged for obtaining multiple gear ratios, e.g. nearly infinitely variable

F16H3/78 . . Special adaptation of synchronisation mechanisms to these gearings

Guide heading: **Gearing for conveying rotary motion by endless flexible members** [N: (control of exclusively fluid gearings for conveying rotary motion by endless flexible members F16H61/38C)]

F16H7/00 **Gearings for conveying rotary motion by endless flexible members** (specific for conveying rotary motion with variable gear ratio or for reversing rotary motion F16H9/00; [N: Belts, V-belts, ropes, cables, and chains F16G, chain-wheels F16H55/30; pulleys F16H55/36])

F16H7/02 . with belts; with V-belts

F16H7/02B . . [N: with belts having a toothed contact surface or regularly spaced bosses or hollows for slipless or nearly slipless meshing with complementary profiled contact surface of a pulley (toothed belts F16G1/28, F16G5/20)]

F16H7/04 . with ropes

F16H7/06 . with chains

F16H7/08 . Means for varying tension of belts, ropes, or chains (pulleys of adjustable construction F16H55/52; [N: gearings with endless belts F16H7/02; tensioning for chains or belts specially adapted for cycles B62M9/16; belt or chain tesioning arrangements for endless conveyers B65G23/44]) [C0108]

F16H7/08B . . [N: for disconnecting the drive]

F16H7/08D . . [N: with vibration damping means] [N0001]

F16H7/08D1 . . . [N: of the dry friction type] [N0001]

F16H7/08D2 . . . [N: of the viscous friction type, e.g. viscous fluid] [N0001]

F16H7/08D3 . . . [N: of the fluid and restriction type, e.g. dashpot] [N0001]

F16H7/08D4 . . . [N: of the dissipating material type, e.g. elastomeric spring] [N0001]

F16H7/08R . . [N: with means for impeding reverse motion] [N0001]

F16H7/10 . . by adjusting the axis of a pulley [N: F16H7/08B takes precedence]

F16H7/12 . . . of an idle pulley

F16H7/12D . . . . [N: with vibration damping means (vibration damping per se F16F)]

F16H7/12D1 . . . . . [N: of the dry friction type]

F16H7/12D2 . . . . . [N: of the viscous friction type, e.g. viscous fluid]

F16H7/12D3 . . . . . [N: of the fluid and restriction type, e.g. dashpot]

F16H7/12D4 . . . . . [N: of the dissipating material type, e.g. elastomeric spring]

F16H7/12N . . . . [N: without vibration damping means]

F16H7/12N2 . . . . . [N: where the axis of the pulley moves along a substantially straight path]
F16H7/12N2R . . . . . [N: with means for impeding reverse motion]
F16H7/12N4 . . . . . [N: where the axis of the pulley moves along a substantially circular path]
F16H7/12N4R . . . . . [N: with means for impeding reverse motion]
F16H7/14 . . . of a driving or driven pulley
F16H7/16 . . . . without adjusting the driving or driven shaft

F16H7/18 . Means for guiding or supporting belts, ropes, or chains (construction of pulleys F16H55/36)
F16H7/20 . . Mountings for rollers or pulleys

F16H7/22 . Belt, rope, or chain shifters

F16H7/24 . Equipment for mounting belts, ropes or chains

F16H9/00 **Gearings for conveying rotary motion with variable gear ratio, or for reversing rotary motion, by endless flexible members** (control of change-speed or reversing-gearings conveying rotary motion F16H59/00 to F16H63/00)

F16H9/02 . without members having orbital motion
F16H9/04 . . using belts, V-belts, or ropes (with toothed belts F16H9/24; pulleys of adjustable construction F16H55/52)
F16H9/06 . . . engaging a stepped pulley
F16H9/08 . . . engaging a conical drum (F16H9/12 takes precedence)
F16H9/10 . . . engaging a pulley provided with radially-actuatable elements carrying the belt
F16H9/12 . . . engaging a pulley built-up out of relatively axially-adjustable parts in which the belt engages the opposite flanges of the pulley directly without interposed belt-supporting members [N: (means for controlling the geometrical interrelationship of pulleys and the endless flexible member, e.g. belt alignment or position of the resulting axial pulley force in the plane perpendicular to the pulley axis F16H61/662P)][C0410]
F16H9/12Y . . . . [N: characterised by means for controlling the geometrical interrelationship of pulleys and the endless flexible member, e.g. belt alignment or position of the resulting axial pulley force in the plane perpendicular to the pulley axis] [N1204]
F16H9/14 . . . . using only one pulley built-up out of adjustable conical parts
F16H9/16 . . . . using two pulleys, both built-up out of adjustable conical parts
F16H9/18 . . . . . only one flange of each pulley being adjustable
F16H9/20 . . . . . both flanges of the pulleys being adjustable
F16H9/22 . . . specially adapted for ropes
F16H9/24 . . using chains or toothed belts, belts in the form of links; Chains or belts specially adapted to such gearing (toothed belts F16G1/28; V-belts in the form of links F16G5/18; toothed V-belts F16G5/20)

F16H9/26 . with members having orbital motion

Guide heading: **Other friction gearing for conveying rotary motion** [N: (control of exclusively friction gearings for conveying rotary motion F16H61/38B)]

F16H13/00 **Gearings for conveying rotary motion by friction between rotary members** (specific for conveying rotary motion with variable gear ratio or for reversing rotary motion F16H15/00; [N: friction discs F16H55/32])

F16H13/02 . without members having orbital motion

F16H13/04 . . with balls or with rollers acting in a similar manner

F16H13/06 . with members having orbital motion

F16H13/08 . . with balls or with rollers acting in a similar manner

F16H13/10 . Means for influencing the pressure between the members

F16H13/12 . . by magnetic forces

F16H13/14 . . for automatically varying the pressure mechanically

F16H15/00 **Gearings for conveying rotary motion with variable gear ratio, or for reversing rotary motion, by friction between rotary members** ([N: gearings for reversal only F16H3/14, F16H3/60]; control of change-speed or reversing-gearings conveying rotary motion F16H59/00 to F16H63/00)

F16H15/01 . characterised by the use of a magnetisable powder or liquid as friction medium between the rotary members

F16H15/02 . without members having orbital motion

F16H15/04 . . Gearings providing a continuous range of gear ratios

F16H15/06 . . . in which a member A of uniform effective diameter mounted on a shaft may co-operate with different parts of a member B

F16H15/08 . . . . in which the member B is a disc with a flat or approximately flat friction surface

F16H15/10 . . . . . in which the axes of the two members cross or intersect

F16H15/12 . . . . . . in which one or each member is duplicated, e.g. for obtaining better transmission, for lessening the reaction forces on the bearings

F16H15/14 . . . . . in which the axes of the members are parallel or approximately parallel

F16H15/16 . . . . in which the member B has a conical friction surface

F16H15/18 . . . . . externally

F16H15/20 . . . . . co-operating with the outer rim of the member A, which is perpendicular or nearly perpendicular to the friction surface of the member B

F16H15/22 . . . . . the axes of the members being parallel or approximately parallel

F16H15/24 . . . . . internally

F16H15/26 . . . . in which the member B has a spherical friction surface centered on its axis of revolution

F16H15/28 . . . . . with external friction surface

F16H15/30 . . . . . with internal friction surface

F16H15/32 . . . . in which the member B has a curved friction surface formed as a surface of a body of revolution generated by a curve which is neither a circular arc centered on its axis of revolution nor a straight line

F16H15/34 . . . . . with convex friction surface

F16H15/36 . . . . . with concave friction surface, e.g. a hollow toroid surface

F16H15/38 . . . . . with two members B having hollow toroid surface opposite to each other, the member or members A being adjustably mounted between the surfaces

F16H15/40 . . . in which two members co-operative by means of balls, or rollers of uniform effective diameter, not mounted on shafts

F16H15/42 . . . in which two members co-operate by means of rings or by means of parts of endless flexible members pressed between the first mentioned members

F16H15/44 . . . in which two members of non-uniform effective diameter directly co-operate with one another

F16H15/46 . . Gearings providing a discontinuous or stepped range of gear ratios

F16H15/48 . with members having orbital motion

F16H15/50 . . Gearings providing a continuous range of gear ratios

F16H15/50B . . . [N: in which two members co-operate by means of balls or rollers of uniform effective diameter, not mounted on shafts]

F16H15/50C . . . [N: in which two members of non-uniform effective diameter directly co-operate with one another]

F16H15/52 . . . in which a member of uniform effective diameter mounted on a shaft may co-operate with different parts of another member

F16H15/54 . . . in which two members co-operate by means of rings or by means of parts of endless flexible members pressed between the first-mentionned members

F16H15/56 . . Gearings providing a discontinuous or stepped range of gear ratios

F16H19/00 **Gearings comprising essentially only toothed gears or friction members and not capable of conveying indefinitely-continuing rotary motion** (with intermittently-driving members F16H27/00-F16H31/00; rope or like tackle for lifting or haulage B66D3/00) [C0711]

F16H19/00B . [N: for conveying reciprocating or limited rotary motion] [C1207]

F16H19/00B2 . . [N: comprising a flexible member] [C1006]

F16H19/00B2V . . . [N: for conveying oscillating or limited rotary motion] [N1006]

F16H19/00B2Y . . . [N: for converting reciprocating into an other reciprocating motion] [N1006]

F16H19/02 . for interconverting rotary motion and reciprocating motion

F16H19/02B . . [N: comprising a friction shaft]

F16H19/04 . . comprising a rack

F16H19/04B . . . [N: for converting reciprocating movement in a continuous rotary movement or vice versa, e.g. by opposite racks engaging intermittently for a part of the stroke] [N1204]

F16H19/06 . . comprising [N: flexible members, e.g. an] endless flexible member [C1208]

[N: **WARNING** [C1207]
Groups F16H19/06B - F16H19/06R are not complete pending reclassification; see also this group
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F16H19/06B . . . [N: with means to double or half the stroke of the reciprocating member] [N1204]

F16H19/06G . . . [N: the flexible member, e.g. cable, being wound on a drum or thread for

ng axial movement parallel to the drum] [N1204]

F16H19/06H . . . [N: for converting reciprocating movement into oscillating movement and vice versa, the reciprocating movement is perpendicular to the axis of oscillation] [N1204]

F16H19/06I . . . [N: the flexible member, e.g. a cable, being wound with one string to a drum and unwound with other string from the same or an other drum to create reciprocating movement of the flexible member] [N1204]

F16H19/06J . . . [N: the flexible member being a non-buckling chain] [N1204]

F16H19/06K . . . [N: the flexible push member uses a bended profile to generate stiffness, e.g. spreading belts] [N1204]

F16H19/06L . . . [N: using guided flexible members, i.e. the flexible member being supported at least partially by a guide to transmit the reciprocating movement] [N1204]

F16H19/06M . . . [N: with flexible members between discs creating reciprocation by relative rotation of the discs] [N1204]

F16H19/06N . . . [N: using twisting movement of flexible members to shorten the axial length] [N1204]

F16H19/06O . . . [N: combined with means for creating non-linear characteristics, e.g. cams; Means for creating different velocity on forward and reverse stroke] [N1204]

F16H19/06P . . . [N: with telescopic means, e.g. for supporting or shielding the reciprocating member] [N1204]

F16H19/06R . . . [N: characterised by means for tensioning the flexible member] [N1204]

F16H19/08 . for interconverting rotary motion and oscillating motion

Guide heading: **Gearing for conveying or converting motion by means of levers, links, or cams** (combination of gearings of different types F16H37/00)

F16H21/00 **Gearings comprising primarily only links or levers, with or without slides**

F16H21/02 . the movements of two or more independently-moving members being combined into a single movement

F16H21/04 . Guiding mechanisms, e.g. for straight-line guidance (for drawing-machines B43L)

F16H21/06 . which can be made ineffective when desired

F16H21/08 . . by pushing a reciprocating rod out of its operative position

F16H21/10 . all movement being in or parallel to a single plane

F16H21/12 . . for conveying rotary motion

F16H21/14 . . . by means of cranks, eccentrics, or like members fixed to one rotary member and guided along tracks on the other

F16H21/16 . . for interconverting rotary motion and reciprocating motion

F16H21/18 . . . Crank gearings; Eccentric gearings

F16H21/20 . . . . with adjustment of throw (adjustable cranks or eccentrics F16C3/28; adjustable connecting-rods F16C7/06)

F16H21/22 . . . . with one connecting-rod and one guided slide to each crank or eccentric

F16H21/24 . . . . . without further links or guides

F16H21/26 . . . . . with toggle action

F16H21/28 . . . . . with cams or additional guides

F16H21/30 . . . . . with members having rolling contact

F16H21/32 . . . . . with additional members comprising only pivoted links or arms

F16H21/34 . . . . with two or more connecting-rods to each crank or eccentric

F16H21/36 . . . . without swinging connecting-rod, e.g. with epicyclic parallel motion, slot and crank motion

F16H21/36P . . . . . [N: with planetary gearing having a ratio of 2:1 between sun gear and planet gear]

F16H21/38 . . . . with means for temporary energy accumulation, e.g. to overcome dead-centre positions

F16H21/40 . . for interconverting rotary motion and oscillating motion

F16H21/42 . . . with adjustable throw

F16H21/44 . . for conveying or interconverting oscillating or reciprocating motions

F16H21/46 . with movements in three dimensions

F16H21/48 . . for conveying rotary motions

F16H21/50 . . for interconverting rotary motion and reciprocating motion (F16H23/00 takes precedence)

F16H21/52 . . for interconverting rotary motion and oscillating motion

F16H21/54 . . for conveying or interconverting oscillating or reciprocating motions

F16H23/00 **Wobble-plate gearings; Oblique-crank gearings** [N: (conveying rotary motion with toothed nutating gears F16H1/32B)] [C0501]

F16H23/02 . with adjustment of throw by changing the position of the wobble-member (F16H29/04, F16H33/10 take precedence)

F16H23/04 . with non-rotary wobble-members

F16H23/06 . . with sliding members hinged to reciprocating members

F16H23/08 . . connected to reciprocating members by connecting-rods

F16H23/10 . with rotary wobble-plates with plane surfaces

F16H25/00 **Gearings comprising primarily only cams, cam-followers and screw-and-nut mechanisms**

F16H25/02 . the movements of two or more independently moving members being combined into a single movement

F16H25/04 . for conveying rotary motion

F16H25/06 . . with intermediate members guided along tracks on both rotary members

F16H25/08 . for interconverting rotary motion and reciprocating motion (F16H23/00 takes precedence)

F16H25/10 . . with adjustable throw (adjustable cams F16H53/04)

F16H25/12 . . with reciprocation along the axis of rotation, e.g. gearings with helical grooves and automatic reversal, [N: or cams] (screw mechanism without automatic reversal F16H25/20)

F16H25/12B . . . [N: Gearings with helical grooves and automatic reversal]

F16H25/12C . . . [N: having the cam on an end surface of the rotating element] [C0304]

F16H25/14 . . with reciprocation perpendicular to the axis of rotation (F16H21/36 takes precedence)

F16H25/16 . for interconverting rotary motion and oscillating motion

F16H25/18 . for conveying or interconverting oscillating or reciprocating motions

F16H25/18B . . [N: conveying only reciprocating motion, e.g. wedges]

F16H25/18C . . [N: with reciprocation along the axis of oscillation]

F16H25/20 . . Screw mechanisms (with automatic reversal F16H25/12)

F16H25/20B . . . [N: with arrangements for taking up backlash (F16H25/22B1 takes precedence)]

F16H25/20B1 . . . . [N: with more than one nut or with nuts consisting of more than one bearing part]

F16H25/20B3 . . . . [N: with radial preloading]

F16H25/20C . . . [N: Elements specially adapted for stopping actuators in the end position; Position sensing means] [C1207]

F16H25/20D . . . [N: with both screw and nut being driven, i.e. screw and nut are both rotating] [C0704]

F16H25/20F . . . [N: with means for avoiding overloading]

F16H25/20G . . . [N: with means to disengage the nut or screw from their counterpart; Means for connecting screw and nut for stopping reciprocating movement (F16H25/20C takes precedence)] [C9903]

F16H25/20R . . . [N: comprising alternate power paths, e.g. for fail safe back-up] [N1204]

[N: **WARNING**
This group is not complete pending reclassification; see also F16H25/20 and subgroups
]

F16H25/20V . . . [N: Telescopic screws with at least three screw members in coaxial arrangement] [N1204]

[N: **WARNING**
[N1208]This group is not complete pending reclassification; see also F16H25/20 and subgroups
]

F16H25/22 . . . with balls, rollers, or similar members between the co-operating parts; Elements essential to the use of such members

F16H25/22B . . . . [N: with balls]

F16H25/22B1 . . . . . [N: with arrangements for taking up backlash]

F16H25/22B2 . . . . . [N: with elements for guiding the circulating balls]

F16H25/22B2B . . . . . [N: Axially mounted end-deflectors] [N1204]

F16H25/22B2D . . . . . [N: Cross over deflectors between adjacent thread turns, e.g. S-form deflectors connecting neigbouring threads] [N1204]

F16H25/22B2F . . . . . [N: the device for circulation forming a part of the screw member] [N1204]

F16H25/22B3 . . . . . [N: with cages or means to hold the balls in position]

F16H25/22B3B . . . . . [N: using ball spacers, i.e. spacers separating the balls, e.g. by forming a chain supporting the balls] [N1207]

F16H25/22C . . . . [N: with rollers]

F16H25/22C2 . . . . . [N: Planetary rollers between nut and screw] [N0708]

F16H25/22C4 . . . . . [N: arranged substantially perpendicular to the screw shaft axis] [N0708]

F16H25/22C6 . . . . . [N: arranged substantially in parallel to the screw shaft axis (planetary rollers F16H25/22C2)] [N0708]

F16H25/22D . . . . [N: with rings engaging the screw shaft with the inner perimeter, e.g. using inner rings of a ball bearing] [N0708]

F16H25/22D2 . . . . . [N: Eccentric rings with their axis arranged substantially parallel to the screw shaft axis] [N0708]

F16H25/22D4 . . . . . [N: Rings which are inclined or can pivot around an axis perpendicular to the screw shaft] [N0708]

F16H25/24 . . . Elements essential to such mechanisms, e.g. screws, nuts (F16H25/22 takes precedence)

F16H25/24A . . . . [N: one of the threads being replaced by elements specially formed for engaging the screw or nut, e.g. pins, racks, toothed belts]

F16H25/24C . . . . [N: Screw seals, wipers, scrapers or the like]

F16H25/24D . . . . [N: one of the threads being replaced by a wire or stripmetal, e.g. spring]

F16H25/24L . . . . [N: Brakes; Rotational locks] [N0401]

F16H25/24S . . . . [N: Safety nuts] [N0401]

Guide heading: **Gearings with intermittently-driving member**

F16H27/00 **Step-by-step mechanisms without freewheel members, e.g. Geneva driven** (rotary gearings with cyclically-varying velocity ratio F16H35/02; impulse couplings F16D5/00; clockwork escapements G04B15/00)

F16H27/02 . with at least one reciprocating or oscillating transmission member [N: (F16H27/04 takes precedence)]

F16H27/04 . for converting continuous rotation into a step-by-step rotary movement

F16H27/04B . . [N: Mechanism comprising a member with partially helical tracks]

F16H27/06 . . Mechanisms with driving pins in driven slots, e.g. Geneva drives

F16H27/08 . . with driving toothed gears with interrupted toothing

F16H27/10 . . obtained by means of disengageable transmission members, combined or not combined with mechanisms according to group F16H27/06 or F16H27/08

F16H29/00 **Gearings for conveying rotary motion with intermittently-driving members, e.g. with freewheel action (freewheels F16D41/00; [N: Gearings for converting oscillating or reciprocating movement with freewheeling members or other intermittently-driving members into a rotary movement F16H31/00])** [C0704]

F16H29/02 . between one of the shafts and an oscillating of reciprocating intermediate member, not rotating with either of the shafts (F16H29/20, F16H29/22 take precedence)

F16H29/04 . . in which the transmission ratio is changed by adjustment of a crank, an eccentric a wobble-plate, or cam, on one of the shafts

F16H29/06 . . . with concentric shafts, an annular intermediate member moving around and being supported on an adjustable crank or eccentric

F16H29/08 . . in which the transmission ratio is changed by adjustment of the path of movement, the location of the pivot, or the effective length, of an oscillating connecting member

F16H29/10 . . in which the transmission ratio is changed by directly operating on the intermittently driving members

F16H29/12 . between rotary driving and driven members (F16H29/20, F16H29/22 take precedence)

F16H29/14 . . in which the transmission ratio is changed by adjustment of an otherwise stationary guide member for the intermittently-driving members

F16H29/16 . . in which the transmission ratio is changed by adjustment of the distance between the axes of the rotary members

F16H29/18 . . . in which the intermittently-driving members slide along approximately radial guides while rotating with one of the rotary members

F16H29/20 . the intermittently-acting members being shaped as worms, screws, or racks

F16H29/22 . with automatic speed change

F16H31/00 **Other gearings with freewheeling members or other intermittently driving members** (F16H21/00, F16H23/00, F16H25/00 take precedence; gearings involving the use of automatic changing-mechanisms, e.g. cyclically-actuated reversal gearings, see the appropriate groups)

F16H31/00B . [N: Mechanisms with freewheeling members]

F16H31/00B1 . . [N: Hand-driven ratchets (wrenches of the ratchet type B25B13/46)]

F16H31/00C . [N: Step-by-step mechanisms for rotary motion]

F16H31/00C1 . . [N: with pawls driven by a rotary cam]

F16H31/00C2 . . [N: with pawls driven by a reciprocating or oscillating transmission member (F16H31/00B1, F16H31/00C1 take precedence)]

F16H31/00C3 . . [N: with friction means]

F16H31/00D . [N: Step-by-step mechanisms for linear motion]

F16H31/00D1 . . [N: with friction means]

F16H33/00 **Gearings based on repeated accumulation and delivery of energy**

F16H33/02 . Rotary transmissions with mechanical accumulators, e.g. weights, springs, intermittently-connected fly-wheels

F16H33/04 . . Gearings for conveying rotary motion with variable velocity ratio, in which self-regulation is sought

F16H33/06 . . . based essentially on spring action (ratchet slip couplings F16D7/04)

F16H33/08 . . . based essentially on inertia

F16H33/10 . . . . with gyroscopic action, e.g. comprising wobble-plates, oblique cranks

F16H33/12 . . . . with a driving member connected differentially with both a driven member and an oscillatory member with large resistance to movement, e.g. Constantinesco gearing

F16H33/14 . . . . having orbital members influenced by regulating masses

F16H33/16 . . . . . which have their own free motion, or consist of fluid

F16H33/18 . . . . . of which the motion is constrained

F16H33/18B . . . . . [N: the masses being fixed to the orbital members]

F16H33/20 . for interconversion, based essentially on inertia, of rotary motion and reciprocating or oscillating motion [N: (for converting into a linear propulsion force, i.e. inertia motors F03G3/00)] [C0501]

F16H35/00 Gearings or mechanisms with other special functional features

F16H35/00P . [N: for variation of rotational phase relationship, e.g. angular relationship between input and output shaft (couplings F16D3/10)] [N9601]

F16H35/02 . for conveying rotary motion with cyclically varying velocity ratio (speed-changing mechanisms operating cyclically, see the appropriate groups)

F16H35/06 . Gearings designed to allow relative movement between supports thereof without ill effects (F16H1/26, F16H1/48 take precedence; [N: mounting or supporting gearboxes F16H57/025]) [C1208]

F16H35/08 . for adjustment of members on moving parts from a stationary place

F16H35/10 . Arrangements or devices for absorbing overload or preventing damage by overload ([N: for screw mechanisms F16H25/20F]; couplings for transmitting rotation F16D) [N0804]

F16H35/12 . Transmitting mechanisms with delayed effect (vibration- or shock-dampers in general F16F)

F16H35/14 . Mechanisms with only two stable positions, e.g. acting at definite angular positions

F16H35/16 . Mechanisms for movements or movement relations conforming to mathematical formulae (devices in which computing operations are performed mechanically G06G3/00)

F16H35/18 . Turning devices for rotatable members, e.g. shafts (starting devices for internal-combustion engines F02N)

F16H37/00 Combinations of mechanical gearings, not hereinbefore provided for (applications of "underdrives" or "overdrives" in motor vehicles, combinations with differential gearings in motor vehicles B60K)

F16H37/02 . comprising essentially only toothed or friction gearings

F16H37/02B . . [N: toothed gearing combined with continuous variable friction gearing] [C1208]

F16H37/02B1 . . . [N: the toothed gearing having orbital motion]

F16H37/02C . . [N: toothed gearing combined with a gear using endless flexible members for reversing rotary motion only]

F16H37/04 . . Combinations of toothed gearings only (F16H37/06 takes precedence)

F16H37/04B . . . [N: for conveying rotary motion with constant gear ratio]

[N: **WARNING**

This group is not complete pending a reorganisation; see also subgroups of F16H1/00
]

F16H37/04C . . . [N: change gear transmissions in group arrangement]

F16H37/04C1 . . . . [N: without gears having orbital motion]

F16H37/04C3 . . . . [N: with an additional planetary gear train, e.g. creep gear, overdrive]

F16H37/06 . . with a plurality of driving or driven shafts; with arrangements for dividing torque between two or more intermediate shafts

F16H37/06B . . . [N: with a plurality of driving or driven shafts (F16H37/08 takes precedence)]

F16H37/08 . . . with differential gearing

F16H37/08B . . . . [N: with a plurality of driving or driven shafts]

F16H37/08B1 . . . . . [N: with only one input shaft (differentials for four wheel drive vehicles B60K17/346)] [C0704]

F16H37/08B1D . . . . . [N: and additional planetary reduction gears] [N9608] [C0011]

F16H37/08B2 . . . . . [N: with only one output shaft]

F16H37/08C . . . . [N: with arrangements for dividing torque between two or more intermediate shafts, i.e. with two or more internal power paths (F16H3/72 takes precedence)]

F16H37/08C1 . . . . . [N: at least one power path being a continuously variable transmission, i.e. CVT]

F16H37/08C1B . . . . . [N: CVT using endless flexible members]

F16H37/08C1C . . . . . [N: CVT using friction between rotary members having a first member of uniform effective diameter cooperating with different parts of a second member]

F16H37/08C1D . . . . . [N: CVT using two coaxial friction members cooperating with at least one intermediate friction member]

F16H37/10 . . . . at both ends of intermediate shafts [N: (F16H37/08B takes precedence)]

F16H37/12 . Gearings comprising primarily toothed or friction gearing, links or levers, and cams, or members of at least two of these types (F16H21/14, F16H21/28, F16H21/30 take precedence; toothed or friction gearing or cam gearing with only an additional lever or link, see the appropriate group for the main gearing)

F16H37/12B . . [N: for interconverting rotary motion and oscillating motion]

F16H37/12C . . [N: for interconverting rotary motion and reciprocating motion]

F16H37/12C2 . . . [N: Guiding mechanism using levers combined with gearings for straight line output movement, e.g. by using gears or pulleys with ratio 2:1] [N1205]

F16H37/14 . . the movements of two or more independently-moving members being combined into a single movement (screw mechanisms with both nut and screw being driven F16H25/20D)] [C0704]

F16H37/16 . . with a driving or driven member which both rotates or oscillates on its axis and reciprocates

Guide heading: **Fluid gearing** (fluid actuators F15B; couplings or clutches with a fluid or semi-fluid as power-transmitting means F16D31/00 to F16D39/00; fluid-resistance brakes F16D57/00)

F16H39/00 **Rotary fluid gearing using pumps and motors of the volumetric type, i.e. passing a predetermined volume of fluid per revolution** ([N: application to motor vehicles B60K]; application to lifting or pushing equipment B66F; control of exclusively fluid gearing F16H61/38) [C0110]

F16H39/01 . Pneumatic gearing; Gearing working with sub-atmospheric pressure (pneumatic hammers B25D9/00)

F16H39/02 . with liquid motors at a distance from liquid pumps

F16H39/04 . with liquid motor and pump combined in one unit

F16H39/06 . . pump and motor being of the same type

F16H39/08 . . . each with one main shaft and provided with pistons reciprocating in cylinders

F16H39/10 . . . . with cylinders arranged around and parallel or approximately parallel to the main axis of the gearing

F16H39/12 . . . . . with stationary cylinders

F16H39/14 . . . . . with cylinders carried in rotary cylinder blocks or cylinder-bearing members

F16H39/16 . . . . with cylinders arranged perpendicular to the main axis of the gearing

F16H39/18 . . . . . the connections of the pistons being at the outer ends of the cylinders

F16H39/20 . . . . . the connections of the pistons being at the inner ends of the cylinders

F16H39/22 . . . with liquid chambers shaped as bodies of revolution concentric with the main axis of the gearing

F16H39/24 . . . . with rotary displacement members, e.g. provided with axially or radially movable vanes passing movable sealing members

F16H39/26 . . . with liquid chambers not shaped as bodies of revolution or shaped as bodies of revolution eccentric to the main axis of the gearing

F16H39/28 . . . . with liquid chambers formed in rotary members

F16H39/30 . . . . with liquid chambers formed in stationary members

F16H39/32 . . . . . with sliding vanes carried by the rotor

F16H39/34 . . . in which a rotor on one shaft co-operates with a rotor on another shaft

F16H39/36 . . . . Toothed-gear type

F16H39/38 . . . . Displacement screw-pump type

F16H39/40 . . . Hydraulic differential gearings, e.g. having a rotary input housing with interconnected liquid chambers for both outputs

F16H39/42 . . pump and motor being of different types

F16H41/00 **Rotary fluid gearing of the hydrokinetic type** (control of exclusively fluid gearing F16H61/38)

F16H41/02 . with pump and turbine connected by conduits or ducts

F16H41/04 . Combined pump-turbine units

F16H41/22 . . Gearing systems consisting of a plurality of hydrokinetic units operating alternatively, e.g. made effective or ineffective by filling or emptying or by mecanical clutches

F16H41/24 . Details

F16H41/26 . . Shape of runner blades or channels with respect to function

F16H41/28 . . with respect to manufacture, e.g. blade attachment

F16H41/30 . . relating to venting, lubrication, cooling, circulation of the cooling medium

F16H41/32 . Selection of working fluids (chemical aspects, see the relevant classes)

F16H43/00 **Other fluid gearing, e.g. with oscillating input or output** ([N: generating mechanical vibrations of infrasonic or sonic frequency B06B; percussive tools B25D9/00; mine roof supports for step by step movement E21D23/00; reciprocating-piston machines without rotary main shaft F01B11/08; fluid pressure actuatoars F15B]) [C0110]

F16H43/02 . Fluid gearing actuated by pressure waves

F16H45/00 **Combinations of fluid gearings for conveying rotary motion with couplings or clutches (16H41/22, [N: F16H47/08B] take precedence; conjoint control of driveline clutches and change-speed gearing in vehicles B60W10/02, B60W10/10 [N: and B60W30/18])** [C0704]

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

F16H45/02 . with mechanical clutches for bridging a fluid gearing of the hydrokinetic type (control of torque converter lock-up clutches F16H61/14)

F16H47/00 **Combinations of mechanical gearing with fluid clutches or fluid gearing**(conjoint control of clutch and gearingB60K41/22; control of driveline clutches and change-speed gearing in vehicles B60W10/02 and B60W10/10)

F16H47/02 . the fluid gearing being of the volumetric type

F16H47/04 . . the mechanical gearing being of the type with members having orbital motion

F16H47/06 . the fluid gearing being of the hydrokinetic type

F16H47/06C . . [N: the mechanical gearing being of the friction or endless flexible member type]

F16H47/07 . . using two or more power-transmitting fluid circuits ([N: F16H47/06C,] F16H47/10 take precedence)

F16H47/08 . . the mechanical gearing being of the type with members having orbital motion [N: (F16H47/06C takes precedence)]

F16H47/08B . . . [N: with at least two mechanical connections between the hydraulic device and the mechanical transmissions]

F16H47/10 . . . using two or more power-transmitting fluid circuits

F16H47/12 . . . the members with orbital motion having vanes interacting with the fluid

F16H48/00 **Differential gearings (cooling or lubricating of differential gearing F16H 57/04)** [N1112]

[N: **Notes**
[N1112] When classifying in this main group, in the absence of an indication to the contrary, classification is made in all appropriate places.
]

F16H48/05 . Multiple interconnected differential sets [N1112]

F16H48/06 . with gears having orbital motion [N1112]

F16H48/08 . . comprising bevel gears [N1201]
F16H48/10 . . with orbital spur gears [N1112]
F16H48/11 . . . having intermeshing planet gears [N1112]

F16H48/12 . without gears having orbital motion [N1112]
F16H48/14 . . with cams [N1112]
F16H48/14B . . . [N: consisting of linked clutches using axially movable inter-engaging parts] [N1205]
F16H48/14B2 . . . . [N: with friction clutching members] [N1205]
F16H48/14D . . . [N: with driven cam followers or balls engaging two opposite cams] [N1205]
F16H48/16 . . with freewheels [N1112]
F16H48/18 . . with fluid gearing [N1112]
F16H48/19 . . consisting of two linked clutches [N1112]

F16H48/20 . Arrangements for suppressing or influencing the differential action, e.g. locking devices [N1112]
F16H48/22 . . using friction clutches or brakes [N1112]
F16H48/24 . . using positive clutches or brakes [N1112]
F16H48/26 . . using fluid action, e.g. viscous clutches [N1112]
F16H48/27 . . using internally-actuatable fluid pressure e.g. internal pump types [N1112]
F16H48/28 . . using self-locking gears or self-braking gears [N1112]
F16H48/285 . . . with self-braking intermeshing gears having parallel axes and having worms or helical teeth [N1112]
F16H48/29 . . . with self-braking intermeshing gears having perpendicular arranged axes and having worms or helical teeth [N1112]
F16H48/295 . . using multiple means for force boosting [N1112]
F16H48/30 . . using externally-actuatable means [N1112]
F16H48/32 . . . using fluid pressure actuators [N1112]
F16H48/34 . . . using electromagnetic or electric actuators [N1112]

F16H48/36 . characterised by intentionally generating speed difference between outputs [N1112]

F16H48/38 . Constructional details(the outer casing comprising the differential and supporting input and output shafts F16H 57/037) [N1112]
F16H48/40 . . characterised by features of the rotating cases [N1112]
F16H48/42 . . characterised by features of the input shafts, e.g. mounting of drive gears thereon [N1112]

F16H49/00 **Other gearings**

F16H49/00B . [N: Wave gearings, e.g. harmonic drive transmissions (harmonic drives specially adapted for positioning programme-controlled manipulators B25J9/10B2)]

F16H49/00C . [N: Magnetic gearings with physical contact between gears (rotating torque transmitting elements of the permanent-magnet type H02K49/10B)] [C0704] [M1208]

Guide heading: **Details of gearing or mechanisms** (of screw-and-nut gearing F16H25/00; of fluid gearing F16H39/00 to F16H43/00; shafts, Bowden mechanisms, cranks, eccentrics,

bearings, pivotal, pivotal connections, crossheads, connecting-rods F16C; chains, belts F16G; piston-rods F16J7/00)

F16H51/00 **Levers of gearing mechanisms** ([N: connecting rods or links pivoted at both ends F16C7/00; gear levers F16H59/00]; manipulating levers G05G) [C0704]

F16H51/02 . adjustable

F16H53/00 **Cams; Non-rotary cams; Cam followers, e.g. rollers**

F16H53/02 . Single-track cams for single-revolution cycles; Camshafts with such cams

F16H53/02B . . [N: characterised by their construction, e.g. assembling or manufacturing features (grinding of camshafts B24B19/12)] [C0011]

F16H53/04 . . Adjustable cams

F16H53/06 . Cam-followers (F16H53/08 takes precedence)

F16H53/08 . Multi-track cams, e.g. for cycles consisting of several revolutions; Cam-followers specially adapted for such cams

F16H55/00 **Elements with teeth or friction surfaces for conveying motion; Worms; Pulleys; Sheaves** (pulley-blocks B66D3/04)

F16H55/02 . Toothed members; Worms

F16H55/06 . . Use of materials; Use of treatments of toothed members or worms to affect their intrinsic material properties ([N: coatings for lubrication F16H57/04H; producing gear wheels from plastics or substances in a plastic state B29D15/00; heat treatment C21D9/32; electrolytic surface treatment C25D; heating by electromagnetic field H05B6/00]) [C0812]

F16H55/08 . . Profiling

F16H55/08B . . . [N: Involute profile] [N9506]

F16H55/08B2 . . . . [N: Intersecting-shaft arrangement of the toothed members] [N9506]

F16H55/08B3 . . . . [N: Skewed-shaft arrangement of the toothed members, i.e. non-intersecting shafts] [N9506]

F16H55/08C . . . [N: Novikov-Wildhaber profile] [N9506]

F16H55/08D . . . [N: Flexible toothed member, e.g. harmonic drive] [N9506]

F16H55/08G . . . [N: Non-circular rigid toothed member, e.g. elliptic gear] [N9506] [C9509]

F16H55/08K . . . [N: Intersecting-shaft arrangement of the toothed members (F16H55/08B2, F16H55/08C, F16H55/08D, F16H55/08G take precedence)] [N9506]

F16H55/08L . . . [N: Skewed-shaft arrangement of the toothed members (F16H55/08B3, F16H55/08C, F16H55/08D, F16H55/08G take precedence)] [N9506]

F16H55/08S . . . [N: for improving axial engagement, e.g. a chamfer at the end of the tooth flank] [N0401]

F16H55/08T . . . [N: with corrections on tip or foot of the teeth, e.g. addendum relief for better approach contact] [N0401] [C0410]

F16H55/08W . . . [N: with corrections along the width, e.g. flank width crowning for better load distribution] [N0401] [C0410]

F16H55/10 . . Constructively simple tooth shapes, e.g. shaped as pins, as balls ([N: gearwork for clocks and watches G04B13/00])

F16H55/12 . . with body or rim assembled out of detachable parts

F16H55/14 . . Construction providing resilience or vibration-damping (F16H55/06 takes precedence; resilient coupling of wheel or wheel-rim with shaft F16D3/50, F16D3/80)

F16H55/16 . . . relating to teeth only

F16H55/17 . . Toothed wheels ([N: with simple tooth shapes F16H55/10]; worm wheels F16H55/22; chain wheels F16H55/30) [C1208]

F16H55/17B . . . [N: Toothed belt pulleys]

F16H55/18 . . . Special devices for taking up backlash ([N: in tuner actuating devices H03J, H03J1/06; in gear-train of clocks or watches G04B35/00])

F16H55/20 . . . . for bevel gears

F16H55/22 . . for transmissions with crossing shafts, especially worms, worm-gears (bevel gears, crown wheels, helical gears F16H55/17)

F16H55/24 . . . Special devices for taking up backlash

F16H55/26 . . Racks

F16H55/28 . . . Special devices for taking up backlash

F16H55/28B . . . . [N: using pressure yokes] [N0501]

F16H55/28B2 . . . . . [N: with rollers or balls to reduce friction] [N1204]

F16H55/28B4 . . . . . [N: with asymmetric layout of the yoke] [N1204]

F16H55/28B6 . . . . . [N: comprising two or more pressure yokes] [N1204]

F16H55/30 . . Chain-wheels (specially adapted for cycles B62M)

F16H55/30B . . . [N: for round linked chains, i.e. hoisting chains with identical links] [M1207]

F16H55/32 . Friction members (friction surfaces F16D69/00)

F16H55/34 . . Non-adjustable friction discs

F16H55/36 . . Pulleys (with features essential for adjustments F16H55/52)

F16H55/38 . . . Means or measures for increasing adhesion (in general F16D69/00)

F16H55/40 . . . with spokes (F16H55/48 takes precedence)

F16H55/42 . . . Laminated pulleys

F16H55/44 . . . Sheet-metal pulleys

F16H55/46 . . . Split pulleys

F16H55/48 . . . manufactured exclusively or in part of non-metallic material, e.g. plastics (F16H55/38,F16H55/42,F16H55/46take precedence;[N: manufacture of wooden wheelsB27H7/00]) [C0704]

F16H55/49 . . . Features essential to V-belts pulleys

F16H55/50 . . . Features essential to rope pulleys

F16H55/52 . . Pulleys or friction discs of adjustable construction

F16H55/54 . . . of which the bearing parts are radially adjustable

F16H55/56 . . . of which the bearing parts are relatively axially adjustable

F16H55/56C . . . . [N: actuated by centrifugal masses]

F16H55/56S . . . . [N: only adjustable when pulley is stationary]

F16H57/00 **General details of gearing (of screw-and-nut gearing F16H 25/00; of fluid gearing F16H 39/00-F16H 43/00)** [C1104]

[N: **Notes**Groups F16H57/01, F16H57/021 - F16H57/39 are based on IPC2012.01 [N1104]
]

F16H57/00B . [N: Vibration-damping or noise reducing means specially adapted for gearings (devices for varying tension of belts, ropes or chains with damping means F16H7/08D; toothed members with construction providing vibration damping F16H55/14; reducing vibrations or noise of the gearbox casing F16H57/028; suppression of vibrations or noise of gear selectors F16H59/02B; control of hydrostatic fluid gearing preventing or reducing vibrations or noise F16H61/40W)] [C1104]

F16H57/00D . [N: Shaft assemblies for gearings (camshafts with single track cams F16H53/02)] [N0911]

[N: **WARNING** [C1208]
Groups F16H57/00D and subgroups are not complete pending a reorganisation; see also F16H57/021, F16H57/022
]

F16H57/00D2 . . [N: with gearing elements rigidly connected to a shaft, e.g. securing gears or pulleys by specially adapted splines, keys or methods] [N0911]

F16H57/00D4 . . [N: with gearing elements rotatable supported on the shaft (F16H57/021 takes precedence)] [N0911] [C1208]

F16H57/00D6 . . [N: Special features of coaxial shafts, e.g. relative support thereof] [N0911]

F16H57/01 . Monitoring wear or stress of transmission elements, e.g. for triggering maintenance [N1104]

F16H57/02 . Gearboxes; Mounting gearing therein [C1104]

[N: **WARNING**Subgroups of F16H57/02 are not complete pending reclassification; see provisionally also respective higher groups
[N1104]
]

[N: **Note**

1. 1. When classifying in this group, in the absence of an indication to the contrary, classification is made in all appropriate subgroups.
2.The classification symbols in group F16H57/02 can be followed by additional symbols preceded by the sign "+". The symbols have the meaning as listed below:

```
+B60   specially adapted for vehicles
```

2.
]

F16H57/02D . . [N: the gears being positioned relative to one another by rolling members or by specially adapted surfaces on the gears] [C0108]

F16H57/021 . . Shaft support structures, e.g. partition walls, bearing eyes, casing walls or covers with bearings [N1104]

F16H57/022 . . . Adjustment of transmission shafts or bearings (for compensating misalignment of axes of toothed gearings without orbital motion F16H1/26; for compensating

misalignment of axes of planetary gears F16H1/48) [N1104]

F16H57/023 . . Mounting or installation of gears or shafts in the gearbox casing, e.g. methods or means for assembly [N1104]

F16H57/025 . . Support of transmission casing, e.g. torque arms, or attachment to other devices (mounting of transmissions in vehicles B60K 17/00) [N1104]

F16H57/027 . . Means for venting gearboxes, e.g. air breathers [N1104]

F16H57/028 . . characterised by means for reducing vibration or noise [N1104]

F16H57/029 . . characterised by means for sealing the gearbox casing, e.g. to improve air-tightness [N1104]

F16H57/03 . . characterised by means for reinforcing gearboxes, e.g. ribs [N1104] [M1105]

F16H57/031 . . characterised by covers or lids for gearboxes [N1104] [M1105]

F16H57/032 . . characterised by the materials used [N1104] [M1105]

F16H57/033 . . Series gearboxes, e.g. gearboxes based on the same design being available in different size or gearboxes using a combination of several standardised units [N1104]

F16H57/035 . . Gearboxes for transmissions with endless flexible members [N1104]

F16H57/037 . . Gearboxes for accommodating differential gearings (rotating cases for differential gearings F16H48/40) [N1104]

F16H57/038 . . Gearboxes for accommodating bevel gears (F16H57/037 takes precedence) [N1104]

F16H57/039 . . Gearboxes for accommodating worm gears [N1104]

F16H57/04 . Features relating to lubrication or cooling [N: or heating] ([N: in hydrokinetic gearing F16H41/30;] control of lubrication or cooling in hydrostatic gearing F16H 61/4165) [C0901]

[N: **WARNING**Subgroups of F16H57/04 are not complete pending reclassification; see provisionally also respective higher groups
[N0901]
]

F16H57/04A . . [N: using different fluids, e.g. a traction fluid for traction gearing and a lubricant for bearings or reduction gears] [N1202]

F16H57/04B . . [N: Cleaning of lubricants, e.g. filters or magnets] [N0812]

F16H57/04B2 . . . [N: Lubricant filters] [N1202]

F16H57/04C . . [N: Monitoring quality of lubricant or hydraulic fluids] [N1204]

F16H57/04D . . [N: Absorption elements for lubricants, e.g. oil felts] [C0812]

F16H57/04F . . [N: Exchange or filling of transmission lubricant (filling or draining lubricant of or from machines or engines F01M11/04; servicing, maintaining, repairing, or refitting of vehicles B60S5/00)] [N0812]

F16H57/04G . . [N: characterised by the problem to increase efficiency, e.g. by reducing splash losses] [N1202]

F16H57/04H . . [N: Coatings or solid lubricants, e.g. antiseize layers or pastes] [C0812]

F16H57/04J . . [N: Cooling or heating; Control of temperature] [N0812]

F16H57/04J2 . . . [N: Controlled cooling or heating of lubricant; Temperature control therefor] [N0812]

F16H57/04J4 . . . [N: Air cooling or ventilation; Heat exchangers; Thermal insulations] [N0812]

F16H57/04J4A . . . . [N: Air cooling or ventilation] [N1202]

F16H57/04J4C . . . . [N: Heat exchangers adapted or integrated in the gearing] [N1202]

F16H57/04J4E . . . . [N: Thermal insulations] [N1202]

F16H57/04M . . [N: Guidance of lubricant] [N0812]

F16H57/04M3 . . . [N: on or within the casing, e.g. shields or baffles for collecting lubricant, tubes, pipes, grooves, channels or the like] [N0812] [M1111]

F16H57/04M3A . . . . [N: Lubricant guiding means mounted or supported on the casing, e.g. shields or baffles for collecting lubricant, tubes or pipes (means for guiding lubricant into an axial channel of a shaft F16H57/04M3E; lubrication by injection; injection nozzles or tubes therefore F16H57/04U)] [N1202]

F16H57/04M3C . . . . [N: Lubricant guiding means in the wall of or integrated with the casing, e.g. grooves, channels, holes (means for guiding lubricant into an axial channel of a shaft F16H57/04M3E)] [N1202]

F16H57/04M3E . . . . [N: Means for guiding lubricant into an axial channel of a shaft] [N1202]

F16H57/04M5 . . . [N: on rotary parts, e.g. using baffles for collecting lubricant by centrifugal force] [N0812]

F16H57/04M5B . . . . [N: Grooves with pumping effect for supplying lubricants] [N1202]

F16H57/04M7 . . . [N: within rotary parts, e.g. axial channels or radial openings in shafts] [N0812]

F16H57/04M7C . . . . [N: Means for guiding lubricant directly onto a tooth surface or to foot areas of a gear, e.g. by holes or grooves in a tooth flank] [N1202]

F16H57/04M9 . . . [N: Lubricant guiding means on or inside shift rods or shift forks (shift rods or shift forks to be lubricated, cooled or heated F16H57/04Y3)] [N1202]

F16H57/04P . . [N: relating to lubrication supply, e.g. Pumps (arrangement of pumps F16H57/04P6); Pressure control (grooves with pumping effect for supplying lubricant F16H57/04M5B; generation and variation of line pressure F16H61/00K)] [C1208]

F16H57/04P2 . . . [N: Pressure control for supplying lubricant; Circuits or valves therefor] [N1202]

F16H57/04P4 . . . [N: Pumps] [N1202]

F16H57/04P4B . . . . [N: Pumps of jet type, e.g. jet pumps with means to inject high pressure fluid to the suction area thereby supercharging the pump or means reducing cavitations] [N1202]

F16H57/04P4D . . . . [N: Pumps with different power sources, e.g. one and the same pump may selectively driven by either the engine or an electric motor] [N1202]

F16H57/04P6 . . . [N: Arrangements of pumps] [N1202]

F16H57/04P8 . . . [N: for supply in case of failure, i.e. auxiliary supply] [N1202]

F16H57/04P10 . . . [N: for supply of lubricant during tilt or high acceleration, e.g. problems related to the tilt or extreme acceleration of the transmission casing and the supply of lubricant under these conditions] [N1202]

F16H57/04P12 . . . [N: for supply of different gearbox casings or sections] [N1202]

F16H57/04P14 . . . [N: the supply forming part of the transmission control unit, e.g. for automatic transmissions] [N1202]

F16H57/04Q . . [N: Control of lubricant levels, e.g. lubricant level control dependent on temperature] [N0704] [C1202]

F16H57/04Q4 . . . [N: Sensors or indicators for controlling the fluid level] [N1202]

F16H57/04R . . [N: Lubricant storage reservoirs, e.g. reservoirs in addition to a gear sump for collecting lubricant in the upper part of a gear case] [N1202]

F16H57/04R2 . . . [N: Oil pans] [N1204]

F16H57/04R4 . . . [N: Section walls to divide a gear sump] [N1202]

F16H57/04R6 . . . [N: Sealings between different partitions of a gearing or to a reservoir (means for sealing gearboxes F16H57/029)] [N1204]

F16H57/04U . . [N: Lubrication by injection; Injection nozzles or tubes therefor (oil mist or spray lubrication F16H57/04W)] [N0704] [C0812]

F16H57/04V . . [N: Splash lubrication (characterised by the problem reducing losses, e.g. splash losses F16H57/04G)] [N0704] [C1202]

F16H57/04W . . [N: Oil-mist or spray lubrication ; Means to reduce foam formation (lubrication by injection F16H57/04U; venting F16H57/02B)] [N0704] [C0812]

F16H57/04W2 . . . [N: Oil-mist or spray lubrication] [N1202]

F16H57/04W4 . . . [N: Means to reduce foam formation] [N1202]

F16H57/04X . . [N: Grease lubrication; Drop-feed lubrication] [N0704] [C0812]

F16H57/04X2 . . . [N: Grease lubrication] [N1202]

F16H57/04X4 . . . [N: Drop-feed lubrication] [N1202]

F16H57/04Y . . [N: Elements of gearings to be lubricated, cooled or heated] [N0704] [C1111]

F16H57/04Y3 . . . [Shift rods or shift forks] [N1202]

F16H57/04Y5 . . . [N: Bearings or seals] [N0704]

F16H57/04Y5A . . . . [N: Bearing] [N1202]

F16H57/04Y5C . . . . [N: Seals] [N1202]

F16H57/04Y7 . . . [N: Friction devices, e.g. clutches or brakes] [N1202]

F16H57/04Y8 . . . [N: Engine and gearing, i.e. joint lubrication or cooling or heating thereof (electric machines and gearing F16H57/04Y9] [N1202]

F16H57/04Y9 . . . [N: Electric machines and gearing, i.e. joint lubrication or cooling or heating thereof] [N1202]

F16H57/04Y11 . . . [N: Synchromesh devices] [N1202]

F16H57/04Y13 . . . [N: Gears or bearings on planet carriers] [N1202]

F16H57/04Z . . [N: Type of gearings to be lubricated, cooled or heated] [N0704]

F16H57/04Z2 . . . [N: Gearings with gears having orbital motion] [N0812]

F16H57/04Z2B . . . . [N: Axle or inter-axle differentials] [N0812]

F16H57/04Z2D . . . . [N: with variable gear ratio or for reversing rotary motion] [N1202]

F16H57/04Z2F . . . . [N: with fixed gear ratio (differentials F16H57/04Z2B)] [N1202]

F16H57/04Z4 . . . [N: Friction gearings] [N0812]

F16H57/04Z4B . . . . [N: with endless flexible members, e.g. belt CVTs] [N0812]

F16H57/04Z4D . . . . [N: of the toroid type] [N1202]

F16H57/04Z4F . . . . [N: of the cone ring type] [N1202]

F16H57/04Z6 . . . [N: Gearings with spur or bevel gears (differentials with spur or bevel gears F16H57/04Z2B)] [N0812] [C1104]

F16H57/04Z6B . . . . [N: with variable gear ratio or for reversing rotary motion] [N1202]

F16H57/04Z6D . . . . [N: with fixed gear ratio] [N1202]

F16H57/04Z8 . . . [N: Screw mechanisms] [N0704] [C1202]

F16H57/04Z10 . . . [N: Worm gearings] [N1104]

F16H57/05 . . of chains (for conveyers B65G45/02) [C0704]

F16H57/08 . of gearing with members having orbital motion

F16H57/08B . . [N: Planet carriers]

F16H57/10 . . Braking arrangements

F16H57/12 . Arrangements for adjusting or for taking-up backlash not provided for elsewhere

Guide heading:

Control of gearings conveying rotary motion (orbital toothed gearings with a secondary drive in order to vary the speed ratio of driving or feeding mechanisms of machine tools B23Q5/12, B23Q5/46; conjoint control of drive units for vehicles B60K41/00; cycle transmissions B62M; marine propulsion B63H)

Notes

1. Attention is drawn to the Notes following group B60K41/00.

2. In groups F16H59/00 to F16H63/00, clutches positioned within a gearbox are considered as comprising part of the gearings.

3. In groups F16H59/00 to F16H63/00, the following terms or expressions are used with the meaning indicated:

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

4. Combinations of features individually covered by group F16H61/00 and one or both of groups F16H59/00 and F16H63/00 are classified in group F16H61/00.

5. Combinations of features individually covered by groups F16H59/00 and F16H63/00 are classified in group F16H63/00.

[N: IPC8]When classifying in groups F16H59/00 to F16H63/00, control inputs or types of gearing, which are not identified by the preceding notes concerning combinations, and which are considered to represent information of interest for search, may also be classified. Such non-obligatory classification should be given as "additional information", e.g. selected from subgroup F15H61/66 relating to the type of gearing controlled or from group F16H59/00 relating to control inputs

F16H59/00 **Control inputs to** [N: control units of] **change-speed-, or reversing-gearings for conveying rotary motion**

F16H59/02 . Selector apparatus

[N: **Note**

Selection apparatus of general applicability or of interest apart from its use in control of gearings conveying rotary motion is classified or is also classified in subclass G05G]

F16H59/02A . . [N: for automatic transmissions with means for range selection and manual shifting, e.g. range selector with tiptronic] [N0011]

F16H59/02B . . [N: with means for suppression of vibrations or reduction of noise]

F16H59/02C . . [N: with sealing means, e.g. against entry of dust] [C9711]

F16H59/02E . . [N: with electric switches or sensors not for gear or range selection, e.g. for controlling auxiliary devices (for gear selection F16H59/04G; for range selection F16H59/10E)] [C1207]

F16H59/02M . . [N: Constructional features of the selector lever, e.g. grip parts, mounting or manufacturing] [N0011] [M1207]

F16H59/04 . . Ratio selector apparatus

F16H59/04B . . . [N: consisting of a final output mechanism, e.g. ratio selector being directly linked to a shiftfork]

F16H59/04C . . . [N: comprising a final actuating mechanism (multiple final output mechanism in a gearbox F16H63/08)] [C0011]

F16H59/04G . . . [N: consisting of electrical switches or sensors (range selectors with electric switches or sensors F16H59/10E)] C1011]

F16H59/04H . . . [N: consisting of fluid valves]

F16H59/06 . . . the ratio being infinitely variable

F16H59/08 . . Range selector apparatus

F16H59/10 . . . comprising levers

F16H59/10E . . . . [N: consisting of electrical switches or sensors]

F16H59/12 . . . comprising push button devices

F16H59/14 . Inputs being a function of torque or torque demand

F16H59/14B . . [N: of rate of change of torque or torque demand]

F16H59/16 . . Dynamometric measurement of torque

F16H59/18 . . dependent on the position of the accelerator pedal

F16H59/20 . . . Kickdown

F16H59/22 . . . Idle position

F16H59/24 . . dependent on the throttle opening

F16H59/26 . . dependent on pressure

F16H59/28 . . . Gasifier pressure in gas turbines

F16H59/30 . . . Intake manifold vacuum

F16H59/32 . . . Supercharger pressure in internal combustion engines

F16H59/34 . . dependent on fuel feed

F16H59/36 . Inputs being a function of speed

F16H59/38 . . of gearing elements

F16H59/40 . . . Output shaft speed

F16H59/42 . . . Input shaft speed

F16H59/44 . . dependent on machine speed of the machine, [N: e.g. the vehicle] [M1207]

F16H59/46 . . dependent on a comparison between speeds

F16H59/48 . Inputs being a function of acceleration

F16H59/50 . Inputs being a function of the status of the machine, e.g. position of doors or safety belts

F16H59/52 . . dependent on the weight of the machine, e.g. change in weight resulting from passengers boarding a bus

F16H59/54 . . dependent on signals from the brakes, e.g. parking brakes

F16H59/56 . . dependent on signals from the main clutch

F16H59/58 . . dependent on signals from the steering

F16H59/60 . Inputs being a function of ambient conditions

F16H59/62 . . Atmospheric pressure

F16H59/64 . . Atmospheric temperature

F16H59/66 . . Road conditions, e.g. slope, slippery

F16H59/68 . Inputs being a function of gearing status

F16H59/70 . . dependent on the ratio established

F16H59/72 . . dependent on oil characteristics, e.g. temperature, viscosity

F16H59/74 . Inputs being a function of engine parameters (F16H59/14 takes precedence)

F16H59/76 . . Number of cylinders operating

F16H59/78 . . Temperature

F16H61/00 **Control functions within** [N: control units of] **change-speed- or reversing-gearings for conveying rotary motion;** [N: Control of exclusively fluid gearing, friction gearing, gearings with endless flexible members or other particular types of gearing]

F16H61/00D . [N: Arrangement or mounting of elements of the control apparatus, e.g. valve assemblies or snapfittings of valves; Arrangements of the control unit on or in the transmission gearbox] [N0203]

F16H61/00D1 . . [N: Special features of electronic control units] [N1204]

[N: **WARNING**
This group is not complete pending reclassification; see also F16H61/00D [N1207]
]

F16H61/00D2 . . [N: Special features of hydraulic control units, e.g. valve plates or valve units] [N0410] [C1207]

F16H61/00K . [N: Generation or control of line pressure] [M1207]

F16H61/00K1 . . [N: Supply of control fluid; Pumps therefore] [N1208]

[N: **WARNING** [N1208]
Group F16H61/00K1 and subgroups are not complete pending a reorganisation, see also F16H61/00K
]

F16H61/00K1B . . . [N: using a single pump driven by different power sources] [N1204]

F16H61/00K1D . . . [N: using an auxiliary pump driven by a different power source than the engine]

N1204]

F16H61/00T . [N: Braking of gear output shaft, by simultaneous engagement of clutches for different gears (engine braking F16H61/21)] [N0410] [M1208]

F16H61/02 . characterised by the signals used [N: (for shift actuators F16H61/28, for continuously variable gearings F16H61/66)] [M1208]

[N: **Notes**

1. Control units where gearshift is controlled by an electric circuit, are classified in F16H61/02E

2. Control units where gearshift is controlled by hydraulic signals and a subfunction, e.g. kickdown, is controlled by an electric circuit, are classified in F16H61/02H with indexing of the electric features

]

F16H61/02E . . [N: the signals being electric (F16H61/04 takes precedence)]

F16H61/02E1 . . . [N: for gearshift control, e.g. control functions for performing shifting or generation of shift signal] [C0410]

F16H61/02E1L . . . . [N: Layout of electro-hydraulic control circuits, e.g. arrangement of valves (for control of actuators selecting and moving final output members, e.g. shift forks F16H61/28E)] [N0410] [C1207]

F16H61/02E1L2 . . . . . [N: characterised by low integration or small number of valves] [N0410]

F16H61/02E1M . . . . [N: characterised by the method for generating shift signals]

F16H61/02E1R . . . . [N: characterised by initiating reverse gearshift]

F16H61/02E3 . . . [N: Control units where shifting is directly initiated by the driver, e.g. semi-automatic transmissions (generation of movements for final actuating mechanisms F16H61/28)] [C9709]

[N: **WARNING**
This group is not complete pending reclassification; see also groups F16H61/02E1, F16H61/02E1L [N1207]
]

F16H61/02E4 . . . [N: Elements specially adapted for electric control units, e.g. valves for converting electrical signals to fluid signals]

F16H61/02H . . [N: the signals being hydraulic (F16H61/04 takes precedence)]

F16H61/02H1 . . . [N: for gearshift control, e.g. control functions for performing shifting or generation of shift signals] [C0410]

F16H61/02H1L . . . . [N: Layout of hydraulic control circuits, e.g. arrangement of valves (for control of actuators selecting and moving final output members, e.g. shift forks F16H61/30)] [N0410] [C1207]

F16H61/02H1L2 . . . . . [N: characterised by low integration or small number of valves] [N0410]

F16H61/02H1R . . . . [N: characterised by initiating reverse gearshift]

F16H61/02H3 . . . [N: Control units where shifting is directly initiated by the driver, e.g. semi-automatic transmissions (generation of movements for final actuating mechanisms F16H61/28)] [C9709]

[N: **WARNING**
This group is not complete pending reclassification; see also groups F16H61/02H1, F16H61/02H1L [N1207]
]

F16H61/02H4 . . . [N: Elements specially adapted for hydraulic control units, e.g. valves]
F16H61/02H4G . . . . [N: Governor valves]
F16H61/02H4M . . . . [N: Manual valves]
F16H61/02H4T . . . . [N: Throttle valves]
F16H61/02M . . [N: the signals being purely mechanical]
F16H61/02M1 . . . [N: Automatic gear shift control, e.g. initiating shift by centrifugal forces] [N9709]
F16H61/02M3 . . . [N: Gear shift control where shifting is directly initiated by the driver, e.g. semi-automatic transmissions] [N9709]

F16H61/04 . Smoothing ratio shift
F16H61/04B . . [N: Synchronisation before shifting] [N0410]
F16H61/04E . . [N: by using electrical signals (F16H61/04B and F16H61/06E take precedence)] [C0410]
F16H61/06 . . by controlling rate of change of fluid pressure
F16H61/06E . . . [N: using electric control means] [M1207]
F16H61/06H . . . [N: using fluid control means] [M1207]
F16H61/06H1 . . . . [N: using an accumulator]
F16H61/06H2 . . . . [N: using an orifice control valve (F16H61/06H1 takes precedence)]
F16H61/08 . . Timing control

F16H61/10 . Regulating shift hysteresis

F16H61/12 . Detecting malfunction or potential malfunction, e.g. fail safe (in control of hydrostatic gearing F16H 61/4192); [N: Circumventing or fixing failures] [C1207]

F16H61/14 . Control of torque converter lock-up clutches
F16H61/14C . . [N: using means only actuated by centrifugal force]
F16H61/14C2 . . . [N: the means being hydraulic valves]
F16H61/14E . . [N: using electric control means] [N9812] [C1207]
F16H61/14M . . [N: using mechanical control means] [C1207]

F16H61/16 . Inhibiting [N: or initiating] shift during unfavourable conditions, [N: e.g. preventing forward reverse shift at high vehicle speed, preventing engine over speed (unintentional control input F16H61/18)] [C1207]

F16H61/18 . Preventing unintentional or unsafe shift, [N: e.g. preventing manual shift from highest gear to reverse gear] [C1208]

F16H61/20 . Preventing gear creeping; [N: Transmission control during standstill, e.g. hill hold control] [C1208]

F16H61/21 . Providing engine brake control [N9903]

F16H61/22 . Locking [N: of the control input devices] (F16H63/34 takes precedence; [N: vehicle fittings for preventing unauthorised use, e.g. ignition keys interlocked with gear box or gear lever B60R25/06]) [C1208]

F16H61/24 . Providing feel, e.g. to enable selection

F16H61/26 . Generation or transmission of movements for final actuating mechanisms

Notes

1. The generation or transmission of movements comprising only the selector apparatus, is classified in group F16H59/00.

2. The generation or transmission of movements, when part of the final output mechanisms, is classified in group F16H63/00.

F16H61/28 . . with at least one movement of the final actuating mechanism being caused by a non-mechanical force, e.g. power-assisted

F16H61/28E . . . [N: using electric control signals, e.g. electro-hydraulic control (F16H61/30, F16H61/32 take precedence; methods for generating shift signals F16H61/02E1M)] [N9709] [C0011] [N9709] [C1208]

F16H61/28E3 . . . . [N: with a control using only relays and switches] [N9709]

F16H61/30 . . . Hydraulic [N: or pneumatic] motors [N: or related fluid control means] therefor [C9709]

F16H61/32 . . . Electric motors [N: actuators or related electrical control means] therefor [C9709]

F16H61/34 . . comprising two mechanisms, one for the preselection movement, and one for the shifting movement (F16H61/36 takes precedence)

F16H61/36 . . with at least one movement being transmitted by a cable

F16H61/38 . Control of exclusively fluid gearing [C0203]

F16H61/40 . . hydrostatic (involving modification of the gearing F16H39/02, F16H39/04)

F16H61/4008 . . . Control of circuit pressure [N1003]

F16H61/4017 . . . . Control of high pressure, e.g. avoiding excess pressure by a relief valve [N1003]

F16H61/4026 . . . . Control of low pressure [N1003]

F16H61/4035 . . . Control of circuit flow [N1003]

F16H61/4043 . . . Control of a bypass valve [N1003]

F16H61/4052 . . . . by using a variable restriction, e.g. an orifice valve [N1003]

F16H61/4061 . . . Control related to directional control valves, e.g. change-over valves, for crossing the feeding conduits (forward reverse switching by using swash plate F16H61/438) [N1003]

F16H61/4069 . . . Valves related to the control of neutral, e.g. shut off valves (zero tilt rotation holding means F16H61/439) [N1003]

F16H61/4078 . . . Fluid exchange between hydrostatic circuits and external sources or consumers [N1003]

F16H61/4096 . . . . with pressure accumulators [N1003]

F16H61/4104 . . . . Flushing, e.g. by using flushing valves or by connection to exhaust [N1003]

F16H61/4131 . . . . Fluid exchange by aspiration from reservoirs, e.g. sump [N1003]

F16H61/4139 . . . . Replenishing or scavenging pumps, e.g. auxiliary charge pumps [N1003]

F16H61/4148 . . . Open loop circuits [N1003]

F16H61/4157 . . . Control of braking, e.g. preventing pump over-speeding when motor acts as a pump [N1003]

F16H61/4165 . . . Control of cooling or lubricating [N1003]

F16H61/4174 . . . Control of venting, e.g. removing trapped air [N1003]

F16H61/4183 . . . Preventing or reducing vibrations or noise, e.g. avoiding cavitations [N1003]

F16H61/4192 . . . Detecting malfunction or potential malfunction, e.g. fail safe [N1003]

F16H61/42 . . . involving adjustment of a pump or motor with adjustable output or capacity[N: (F16H61/46 takes precedence)] [C0304]

F16H61/421 . . . . Motor capacity control by electro-hydraulic control means, e.g. using solenoid valves [N1003]

F16H61/423 . . . . Motor capacity control by fluid pressure control means [N1003]

F16H61/425 . . . . Motor capacity control by electric actuators [N1003]

F16H61/427 . . . . Motor capacity control by mechanical control means, e.g. by levers or pedals [N1003]

F16H61/431 . . . . Pump capacity control by electro-hydraulic control means, e.g. using solenoid valves [N1003]

F16H61/433 . . . . Pump capacity control by fluid pressure control means [N1003]

F16H61/435 . . . . Pump capacity control by electric actuators [N1003]

F16H61/437 . . . . Pump capacity control by mechanical control means, e.g. by levers or pedals [N1003]

F16H61/438 . . . . Control of forward-reverse switching, e.g. control of the swash plate causing discharge in two directions (using a directional control valve F16H61/4061) [N1003]

F16H61/439 . . . . Control of the neutral position, e.g. by zero tilt rotation holding means (using a neutral valve or a shutoff valve F16H61/4069) [N1003]

F16H61/44 . . . with more than one pump or motor in operation [C0712]

F16H61/444 . . . . by changing the number of pump or motor units in operation [N1003]

F16H61/448 . . . . Control circuits for tandem pumps or motors [N1003]

F16H61/452 . . . . Selectively controlling multiple pumps or motors, e.g. switching between series or parallel [N1003]

F16H61/456 . . . . Control of the balance of torque or speed between pumps or motors (hydrostatic differentials F16H 48/18) [N1003]

F16H61/46 . . . Automatic regulation in accordance with output requirements [C1003]

F16H61/46B . . . . [N: not involving a variation of the output capacity of the main pumps or motors]

F16H61/462 . . . . for achieving a target speed ratio [N1003]

F16H61/465 . . . . for achieving a target input speed [N1003]

F16H61/468 . . . . for achieving a target input torque [N1003]

F16H61/47 . . . . for achieving a target output speed [N1003]

F16H61/472 . . . . for achieving a target output torque [N1003]

F16H61/475 . . . . for achieving a target power, e.g. input power or output power [N1003]

F16H61/478 . . . . for preventing overload, e.g. high pressure limitation [N1003]

F16H61/48 . . hydrodynamic

F16H61/50 . . . controlled by changing the flow, force, or reaction of the liquid in the working circuit, while maintaining a completely filled working circuit

F16H61/52 . . . . by altering the position of blades

F16H61/54 . . . . . by means of axially-shiftable blade runners

F16H61/56 . . . . . to change the blade angle

F16H61/58 . . . . by change of the mechanical connection of, or between, the runners

F16H61/60 . . . . . exclusively by the use of freewheel clutches

F16H61/62 . . . . . involving use of a speed-changing gearing or of a clutch in the connection between runners (F16H45/02, F16H61/60 take precedence)

F16H61/64 . . . controlled by changing the amount of liquid in the working circuit

[N: **WARNING**
[N0410] New subgroups of IPC8 introduced in October 2004 are not complete. Documents from F16H61/00 and subgroups are in the process of being reorganised to the new groups
]

F16H61/66 . specially adapted for continuously variable gearings (F16H61/38 takes precedence) [N0410]

F16H61/662 . . with endless flexible means [N0410]

F16H61/662B . . . [N: controlling shifting exclusively as a function of speed and torque] [N0410] [C1011]

F16H61/662D . . . [N: controlling shifting exclusively as a function of speed] [N0410] [C1011]

F16H61/662D2 . . . . [N: using electrical or electronical sensing or control means] [N0410]

F16H61/662D4 . . . . [N: using only hydraulical and mechanical sensing or control means] [N0410]

F16H61/662D6 . . . . [N: using purely mechanical sensing or control means] [N0410]

F16H61/662F . . . [N: controlling shifting exclusively as a function of torque] [N0410] [C1011]

F16H61/662H . . . [N: controlling of shifting being influenced by a signal derived from the engine and the main coupling] [N0410]

F16H61/662H2 . . . . [N: using electrical or electronical sensing or control means] [N0410]

F16H61/662H4 . . . . [N: using only hydraulical and mechanical sensing or control means] [N0410]

F16H61/662H6 . . . . [N: using purely mechanical sensing or control means] [N0410]

F16H61/662K . . . [N: characterised by means for controlling the torque transmitting capability of the gearing] [N0410]

F16H61/664 . . Friction gearings [N0410]

F16H61/664B . . . [N: controlling shifting exclusively as a function of speed and torque] [N0410] [C1011]

F16H61/664D . . . [N: controlling shifting exclusively as a function of speed] [N0410] [C1011]

F16H61/664F . . . [N: controlling shifting exclusively as a function of torque] [N0410] [C1011]

F16H61/664H . . . [N: controlling of shifting being influenced by a signal derived from the engine and the main coupling] [N0410]

F16H61/664K . . . [N: characterised by the means for controlling the torque transmitting capability of the gearing] [N0410]

F16H61/68 . specially adapted for stepped gearings [N0410]

F16H61/682 . . with interruption of drive [N0410]

F16H61/684 . . without interruption of drive [N0410]

F16H61/686 . . . with orbital gears [N0410]

F16H61/688 . . . with two inputs, e.g. selection of one of two torque-flow paths by clutches [N0410]

F16H61/70 . specially adapted for change-speed gearing in group arrangement, i.e. with separate change-speed gear trains arranged in series, e.g. range or overdrive-type gearing arrangements [N0410]

F16H61/70E . . [N: using electric or electrohydraulic control means (timing of auxilliary gear shifts F16H61/08B)] [N0410]

F16H61/70H . . [N: using hydraulic and mechanical control means (timing of auxilliary gear shifts F16H61/08B)] [N0410]

F16H61/70M . . [N: using only mechanical control means] [N0410]

[N: **WARNING**
This group is not complete pending reclassification; see also group F16H63/44 [N1207]
]

F16H63/00 **Control outputs** [N: from the control unit] **to change-speed- or reversing-gearings for conveying rotary motion** [N: or to other devices than the final output mechanism]

F16H63/02 . Final output mechanisms therefor; Actuating means for the final output mechanisms

F16H63/04 . . a single final output mechanism being moved by a single final actuating mechanism [N: (Constructional features of the final output mechanisms F16H63/30)]

F16H63/06 . . . the final output mechanism having an indefinite number of positions

F16H63/06E . . . . [N: electric or electro-mechanical actuating means] [N0410]

F16H63/06H . . . . [N: hydraulic actuating means] [N0410]

F16H63/06M . . . . [N: mechanical actuating means] [N0410]

F16H63/08 . . Multiple final output mechanisms being moved by a single common final actuating mechanism [N: (Constructional features of the final output mechanisms F16H63/30)]

F16H63/10 . . . the final actuating mechanism having a series of independent ways of movement, each way of movement being associated with only one final output mechanism

F16H63/12 . . . . two or more ways of movement occurring simultaneously

F16H63/14 . . . the final output mechanisms being successively actuated by repeated movement of the final actuating mechanism

F16H63/16 . . . the final output mechanisms being successively actuated by progressive movement of the final actuating mechanism

F16H63/18 . . . . the final actuating mechanism comprising cams

F16H63/20 . . . with preselection and subsequent movement of each final output mechanism by movement of the final actuating mechanism in two different ways, e.g. guided by a shift gate

F16H63/20Q . . . . [N: the final output mechanisms being mounted coaxially on a single shaft, e.g. mono rail shift mechanism] [N0011] [C0102]

F16H63/22 . . . . the final output mechanisms being simultaneously moved by the final actuating mechanism

F16H63/24 . . each of the final output mechanisms being moved by only one of the various final actuating mechanisms [N:(Constructional features of the final output mechanisms F16H63/30)]

F16H63/26 . . . some of the movements of the final output mechanisms being caused by another final output mechanism

F16H63/28 . . two or more final actuating mechanisms moving the same final output mechanism [N: (Constructional features of the final output mechanisms F16H63/30)]

F16H63/28B . . . [N: with a first final actuating member applying a force to two or more final output members and a second final actuating member locking in position another final output member]

F16H63/30 . . Constructional features of the final output mechanisms

F16H63/30B . . . [N: Bandbrake actuating mechanisms]

F16H63/30C . . . [N: the final output mechanisms having elements remote from the gearbox] [C9410]

F16H63/30D . . . [N: the final output mechanism being characterised by linkages converting movement, e.g. into opposite direction by a pivoting lever linking two shift rods] [M1208]

F16H63/30F . . . [N: Final output mechanisms varying the leverage or force ratio] [C9601]

F16H63/30G . . . [N: Final output mechanisms for reversing] [C0011]

F16H63/30H . . . [N: the final output mechanisms comprising elements moved by fluid pressure (F16H63/30B1 takes precedence)] [C9410]

F16H63/30H1 . . . . [N: comprising friction clutches or brakes (band brake actuating mechanisms F16H63/30B)] [N9410] [C1202]

F16H63/30J . . . [N: the final output mechanisms comprising elements moved by electrical or magnetic force (F16H63/30B1 takes precedence)] [C9410]

F16H63/30J1 . . . . [N: comprising friction clutches or brakes] [N9709]

F16H63/30Q . . . [N: Interrelationship between two or more final output mechanisms (interlocking devices F16H63/36)] [C9410]

F16H63/32 . . . Gear shift yokes, [N: e.g. shift forks] [M1208]

F16H63/34 . . . Locking or disabling mechanisms [M1208]

F16H63/34B . . . . [N: the locking mechanism being moved by the final actuating mechanism]

F16H63/34D . . . . [N: Parking lock mechanisms or brakes in the transmission] [N1103]

F16H63/34D2 . . . . . [N: characterised by pawls or wheels] [N1103]

F16H63/34D2B . . . . . [N: Details of latch mechanisms, e.g. for keeping pawls out of engagement] [N1103]

F16H63/34D4 . . . . . [N: Parking locks engaging axially] [N1103]

F16H63/34D5 . . . . . [N: using friction brakes, e.g. a band brakes] [N1103]

F16H63/34D7 . . . . . [N: with electric actuating means, e.g. shift by wire] [N1103]

F16H63/34D7B . . . . . [N: using electric motors] [N1103]

F16H63/34D7D . . . . . [N: using solenoids] [N1103]

F16H63/34D8 . . . . . [N: with hydraulic actuating means] [N1103]

F16H63/34D9 . . . . . [N: Emergency release or engagement of parking locks or brakes] [N1103]

F16H63/36 . . . . Interlocking devices

F16H63/38 . . . Detents [N: (spring-loaded ball units for holding levers in a limited number of positions G05G5/06R)] [C9509]

F16H63/40 . comprising signals other than signals for actuating the final output mechanisms

F16H63/42 . . Ratio indicator devices

[N: **WARNING**
This group is not complete pending reclassification; see also codes L60K741/22, L60K741/22E [N1207]
]

F16H63/44 . . Signals to the control unit of auxiliary gearing [C0108] [C1207]

F16H63/46 . . Signals to a clutch outside the gearbox

F16H63/48 . . Signals to a parking brake [N: or parking lock; Control of parking locks or brakes being part of the transmission] [C1103]

F16H63/48B . . . [N: Circuits for controlling engagement of parking locks or brakes] [N1103]

F16H63/48F . . . [N: Common control of parking locks or brakes in the transmission and other parking brakes, e.g. wheel brakes] [N1103]

F16H63/50 . . Signals to an engine or motor [N9903] [C0501]

F16H63/50B . . . [N: for smoothing gear shifts] [N0501]