NOTES

1. Combinations including mechanical gearings are classified in groups F16H 37/00 or F16H 47/00, unless they are provided for in groups F16H 1/00 - F16H 35/00.

2. In this subclass, sets of rigidly-connected members are regarded as single members.

3. In this subclass, the following terms or expressions are used with the meanings indicated:
   - “toothed gearing” includes worm gearing and other gearing involving at least one wheel or sector provided with teeth or the equivalent, EXCEPT gearing with chains or toothed belts, which is treated as friction gearing;
   - “conveying motion” includes transmitting energy, and means that the applied and resultant motions are of the same kind, though they may differ in, e.g. speed, direction extent;
   - “rotary” implies that the motion may continue indefinitely;
   - “oscillating” means moving about an axis to an extent which is limited by the construction of the gearing, and which may exceed one revolution, the movement being alternately forwards and backwards during continued operation of the gearing;
   - “reciprocating” means moving substantially in a straight line, the movement being alternately forwards and backwards during continued operation of the gearing;
   - “reversing” or “reversal” means that an applied movement in one direction may produce a resultant movement in either of two opposed directions at will;
   - “central gears” includes any gears whose axis is the main axis of the gearing.

4. Attention is drawn to the following places:
   - A01D 69/06 Gearings in harvesting machines
   - A63H 31/00 Gearing for toys
   - B21B 35/12 Toothed-wheel gearing for metal-rolling mills
   - B60K Arrangement of transmissions in vehicles
   - B61C 9/00 Transmissions for railway locomotives
   - B62D 3/00 Vehicle steering gears
   - B62M Transmissions for cycles
   - B63H 23/00 Transmissions for marine propulsions
   - B63H 25/00 Marine steering gears
   - (B64C 27/12, B64C 27/58) [Transmissions for helicopters]
   - (B64D 35/00) [Transmissions for aircraft]
   - F03D 4/04 Machines, engines, pumps
   - F15B 15/00 Gearings associated with fluid-actuated devices
   - G01D 5/04 Gear used in indicating or recording apparatus in connection with measuring devices
   - H03J 1/00 Driving arrangements for tuning resonant circuits
   - H04L 13/04 Driving mechanisms for apparatus for transmission of coded digital information.

WARNING

In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.
Toothed gearings for conveying rotary motion with variable gear ratio or for reversing rotary motion (speed-changing or reversing mechanisms F16H 59/00 - F16H 63/00)

F16H 1/10 . . . one of the members being internally toothed
F16H 1/12 . . . with non-parallel axes
F16H 1/125 . . . [comprising spiral gears]
F16H 1/14 . . . comprising conical gears only
F16H 1/145 . . . [with offset axes, e.g. hypoid gearings]
F16H 1/16 . . . comprising worm and worm-wheel
F16H 1/163 . . . [with balls between the co-operating parts]
F16H 1/166 . . . [with members rotating around axes on the worm or worm-wheel]
F16H 1/18 . . . the members having helical, herringbone, or 
F16H 1/20 . . . involving more than two intermeshing members
F16H 1/203 . . . [with non-parallel axes (F16H 1/22 takes precedence)]
F16H 1/206 . . . [characterised by the driving or driven member being composed of two or more gear wheels]
F16H 1/216 . . . [with a plurality of driving or driven shafts; with arrangements for dividing torque between two or more intermediate shafts]
F16H 1/222 . . . [with non-parallel axes]
F16H 1/225 . . . [with two or more worm and worm-wheel gearings]
F16H 1/227 . . . [comprising two or more gearwheels in mesh with the same internally toothed wheel]
F16H 1/24 . . . involving gears essentially having intermeshing elements other than involute or cycloidal teeth (F16H 1/16 takes precedence)
F16H 1/26 . . . Special means compensating for misalignment of axes
F16H 1/28 . . . with gears having orbital motion
F16H 1/2809 . . . [with means for equalising the distribution of load on the planet-wheels]
F16H 1/2818 . . . [by allowing limited movement of the ring gear relative to the casing or shaft]
F16H 1/2827 . . . [by allowing limited movement of the planet carrier, e.g. relative to its shaft]
F16H 1/2836 . . . [by allowing limited movement of the planet relative to the planet carrier or by using free floating planets]
F16H 1/2845 . . . [by allowing limited movement of the sun gear]
F16H 1/2854 . . . [involving conical gears]
F16H 1/2863 . . . [Arrangements for adjusting or for taking-up backlash]
F16H 2001/2872 . . . [comprising three central gears, i.e. ring or sun gear, engaged by at least one common orbital gear mounted on an idling carrier]
F16H 2001/2881 . . . [comprising two axially spaced central gears, i.e. ring or sun gear, engaged by at least one common orbital gear wherein one of the central gears is forming the output]
F16H 2001/289 . . . [comprising two or more coaxial and identical sets of orbital gears, e.g. for distributing torque between the coaxial sets]
F16H 1/30 . . . in which an orbital gear has an axis crossing the main axes of the gearing and has helical teeth or is a worm
F16H 1/32 . . . in which the central axis of the gearing lies inside the periphery of an orbital gear
F16H 1/321 . . . [the orbital gear being nutating]
F16H 2001/322 . . . [comprising at least one universal joint, e.g. a Cardan joint]
Toothed gearings for conveying rotary motion

NOTE

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

3/093 . . . [with two or more countershafts]
3/0931 . . . [each countershaft having an output gear meshing with a single common gear on the output shaft]
3/0933 . . . [with coaxial input and output shafts]
3/0935 . . . [with multiple countershafts comprising only one idle gear and one gear fixed to the countershaft]
3/0936 . . . [with multiple countershafts comprising only two idle gears and one gear fixed to the countershaft]
3/0938 . . . [with multiple gears on the input shaft directly meshing with respective gears on the output shaft]
3/095 . . . [with means for ensuring an even distribution of torque between the countershafts]
3/097 . . . [the input and output shafts being aligned on the same axis]
3/10 . . . [with one or more one-way clutches as an essential feature]
3/12 . . . [with means for synchronisation not incorporated in the clutches (synchronised clutches F16D 23/02)]
3/123 . . . [using a brake]
3/126 . . . [using an electric drive]
3/14 . . . [for gearings for reversal only]
3/145 . . . [with a pair of coaxial bevel gears, rotatable in opposite directions]
3/16 . . . [essentially with both gears that can be put out of gear and continuously-meshing gears that can be disengaged from their shafts]
3/18 . . . [for gearings for reversal only]
3/20 . . . [exclusively or essentially using gears that can be moved out of gear]
3/22 . . . [with gears shiftable only axially]
3/24 . . . [with driving and driven shafts coaxial]
3/26 . . . [and two or more additional shafts]
3/28 . . . [an additional shaft being coaxial with the main shafts]
3/30 . . . [with driving and driven shafts not coaxial]
3/32 . . . [and an additional shaft]
3/34 . . . [with gears shiftable otherwise than only axially]
3/36 . . . [with a single gear meshable with any of a set of coaxial gears of different diameters]
3/363 . . . [the teeth of the set of coaxial gears being arranged on a surface of generally conical shape]
3/366 . . . [the teeth of the set of coaxial gears being arranged on a generally flat, e.g. disc-type, surface]
3/38 . . . [with synchro-meshing]
3/385 . . . [with braking means (constructional features of the final output mechanisms for reversing F16H 63/302)]
3/40 . . . [for gearings for reversal only]
3/42 . . . [with gears having teeth formed or arranged for obtaining multiple gear ratios, e.g. nearly infinitely variable]
3/423 . . . [the teeth being arranged on a surface of generally conical shape]
3/426 . . . [the teeth being arranged on a generally flat, e.g. disc-type surface]
3/44 . . . [using gears having orbital motion {(the gear-ratio being changed by inversion of torque direction F16H 3/005)}
3/442 . . . [comprising two or more sets of orbital gears arranged in a single plane]
3/445 . . . [without permanent connection between the input and the set of orbital gears]
3/447 . . . [without permanent connection between the set of orbital gears and the output]
3/46 . . . [gears having only two central gears, connected by orbital gears (F16H 3/68 - F16H 3/78 take precedence)]
3/48 . . . [with single orbital gears or pairs of rigidly-connected orbital gears]
3/50 . . . [comprising orbital conical gears]
3/52 . . . [comprising orbital spur gears]
3/54 . . . [one of the central gears being internally toothed and the other externally toothed]
3/56 . . . [both central gears being sun gears]
3/58 . . . [with sets of orbital gears, each consisting of two or more intermeshing orbital gears]
3/60 . . . [gears for reversal only]
3/62 . . . [gears having three or more central gears (F16H 3/68 - F16H 3/78 take precedence)]
3/64 . . . [composed of a number of gear trains, the drive always passing through all the trains, each train having not more than one connection for driving another train]
3/66 . . . [composed of a number of gear trains without drive passing from one train to another]
3/663 . . . [with conveying rotary motion between axially spaced orbital gears, e.g. RAVIGNEAUX]
3/666 . . . [with compound planetary gear units, e.g. two intermeshing orbital gears (F16H 3/663 takes precedence)]
Gearing for conveying rotary motion by endless flexible members

7/00 Gearnings for conveying rotary motion by endless flexible members (specific for conveying rotary motion with variable gear ratio or for reversing rotary motion) {Belts, V-belts, ropes, cables, and chains F16G, chain-wheels F16H 55/30; pulleys F16H 55/36)}

7/02 . . . with belts; with V-belts
7/03 . . . {with belts having a toothed contact surface or regularly spaced bossses or hollows for slipless or nearly slipless meshing with complementary profiled contact surface of a pulley (toothed belts F16G 1/28, F16G 5/20)}

2007/026 . . . {with belts running in a mist of oil}
7/04 . . . with ropes
7/06 . . . with chains
7/08 . . . Means for varying tension of belts, ropes, or chains (pulleys of adjustable construction F16H 55/52; gearings with endless belts F16H 7/02; tensioning for chains or belts specially adapted for cycles B62M 9/16; belt or chain tensioning arrangements for endless conveyors B65G 23/44)}

2007/0802 . . . {Actuators for final output members)}
2007/0804 . . . {Leaf springs]
2007/0806 . . . [Compression coil springs]
2007/0808 . . . [Extension coil springs]
2007/081 . . . [Torsion springs]
2007/0812 . . . [Fluid pressure]
2007/0814 . . . [with valves opening on surplus pressure]
2007/0817 . . . [with means for venting unwanted gas]
2007/0819 . . . [Rubber or other elastic materials]
2007/0821 . . . [working with gravity]
2007/0823 . . . [Electric actuators]

2007/0825 . . . {influenced by other actuators of output members]
7/0827 . . . [for disconnecting the drive]
7/0829 . . . [with vibration damping means]
7/0831 . . . [of the dry friction type]
7/0834 . . . [of the viscous friction type, e.g. viscous fluid]
7/0836 . . . [of the fluid and restriction type, e.g. dashpot]
7/0838 . . . [of the dissipating material type, e.g. elastomeric spring]

2007/084 . . . [having vibration damping characteristics dependent on the moving direction of the tensioner]
2007/0842 . . . [Mounting or support of tensioner]
2007/0844 . . . [Mounting elements essentially within boundaries of final output members]
2007/0846 . . . [comprising a mechanical stopper]
7/0848 . . . [with means for impeding reverse motion]
2007/0851 . . . [Wedges]
2007/0853 . . . [Ratches]
2007/0855 . . . [comprising a clip member engaging with the rack teeth]
2007/0857 . . . [Screw mechanisms]
2007/0859 . . . [Check valves]
2007/0861 . . . [comprising means for sensing tensioner position]
2007/0863 . . . [Finally actuated members, e.g. constructional details thereof]
2007/0865 . . . [Pulleys]
2007/0868 . . . [comprising means for changing working diameter of pulley]
2007/087 . . . [Sprickets]
2007/0872 . . . [Sliding members]
2007/0874 . . . [Two or more finally actuated members]
2007/0876 . . . [Control or adjustment of actuators]
2007/0878 . . . [Disabling during transport]
2007/088 . . . [Manual adjustment]
2007/0882 . . . [the tension being a function of temperature]
2007/0885 . . . [the tension being a function of engine running condition]
2007/0887 . . . [the tension being a function of load]
2007/0889 . . . [Path of movement of the finally actuated member]
2007/0891 . . . [Linear path]
2007/0893 . . . [Circular path]
2007/0895 . . . [Internal to external direction]
2007/0897 . . . [External to internal direction]
7/10 . . . by adjusting the axis of a pulley {F16H 7/0827 takes precedence)
7/12 . . . of an idle pulley
7/1209 . . . [with vibration damping means (vibration damping per se F16F)]
7/1218 . . . [of the dry friction type]
7/1227 . . . [of the viscous friction type, e.g. viscous fluid]
7/1236 . . . [of the fluid and restriction type, e.g. dashpot]
7/1245 . . . [of the dissipating material type, e.g. elastomeric spring]
7/1254 . . . [without vibration damping means]
7/1263 . . . [where the axis of the pulley moves along a substantially straight path]
7/1272 . . . [with means for impeding reverse motion]
Gearing for conveying rotary motion by endless flexible members

9/00 Gearnings for conveying rotary motion with variable gear ratio, or for reversing rotary motion, by endless flexible members (control of change-speed or reversing-gearings conveying rotary motion F16H 59/00 - F16H 63/00)

9/02 . . . . without members having orbital motion
9/04 . . . . using belts, V-belts, or ropes (with toothed belts F16H 9/24; pulleys of adjustable construction F16H 55/52)
9/06 . . . . engaging a stepped pulley
9/08 . . . . engaging a conical drum (F16H 9/12 takes precedence)
9/10 . . . . engaging a pulley provided with radially-actuable elements carrying the belt
9/12 . . . . engaging a pulley built-up out of relatively axially-adjustable parts in which the belt engages the opposite flanges of the pulley directly without interposed belt-supporting members
9/125 . . . . [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]
9/14 . . . . using only one pulley built-up out of adjustable conical parts
9/16 . . . . using two pulleys, both built-up out of adjustable conical parts
2009/163 . . . . {Arrangements of two or more belt gearings mounted in parallel, e.g. for increasing transmittable torque}
2009/166 . . . . {Arrangements of two or more belt gearings mounted in series, e.g. for increasing ratio coverage}
9/18 . . . . only one flange of each pulley being adjustable
9/20 . . . . both flanges of the pulleys being adjustable
9/22 . . . . specially adapted for ropes
9/24 . . . . using chains or toothed belts, belts in the form of links; Chains or belts specially adapted to such gearing (toothed belts F16G 1/28; V-belts in the form of links F16G 9/18; toothed V-belts F16G 52/20)
2009/245 . . . . [with idle wheels to assist ratio change]
9/26 . . . . with members having orbital motion

Other friction gearing for conveying rotary motion

13/00 Gearings for conveying rotary motion by friction between rotary members (specific for conveying rotary motion with variable gear ratio or for reversing rotary motion F16H 15/00; friction discs F16H 55/32)

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

15/00 Gearings for conveying rotary motion with variable gear ratio, or for reversing rotary motion, by friction between rotary members (gearings for reversal only F16H 3/14, F16H 3/60; control of change-speed or reversing-gearings conveying rotary motion F16H 59/00 - F16H 63/00)

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

F16H

15/36 . . . . . . . with concave friction surface, e.g. a hollow toroid surface
15/38 . . . . . . . with two members B having hollow toroid surfaces opposite to each other, the member or members A being adjustably mounted between the surfaces

2015/383 . . . . . . . (with two or more sets of toroid gearings arranged in parallel)
2015/386 . . . . . . . (with two or more sets of toroid gearings arranged in series)

15/40 . . . in which two members co-operate by means of balls, or rollers of uniform effective diameter, not mounted on shafts
15/42 . . . in which two members co-operate by means of rings or by means of parts of endless flexible members pressed between the first mentioned members
15/44 . . . in which two members of non-uniform effective diameter directly co-operate with one another
15/46 . . . Gearings providing a discontinuous or stepped range of gear ratios
15/48 . . . with members having orbital motion
15/50 . . . Gearings providing a continuous range of gear ratios
15/503 . . . [in which two members co-operate by means of balls or rollers of uniform effective diameter, not mounted on shafts]
15/506 . . . [in which two members of non-uniform effective diameter directly co-operate with one another]
15/52 . . . in which a member of uniform effective diameter mounted on a shaft may co-operate with different parts of another member
15/54 . . . in which two members co-operate by means of rings or by means of parts of endless flexible members pressed between the first-mentioned members
15/56 . . . Gearings providing a discontinuous or stepped range of gear ratios

19/00 Gearings comprising essentially only toothed gears or friction members and not capable of conveying indefinitely-continuing rotary motion (with intermittently-driving members F16H 27/00 - F16H 31/00; rope or like tackle for lifting or haulage B66D 3/000)
19/001 . . . (for conveying reciprocating or limited rotary motion)
19/003 . . . [comprising a flexible member]
19/005 . . . [for conveying oscillating or limited rotary motion]
19/006 . . . [for converting reciprocating into an other reciprocating motion]
19/008 . . . [Facilitating the engagement or stopping of gear sections]
19/02 . . . for interconverting rotary [or oscillating] motion and reciprocating motion
19/025 . . . [comprising a friction shaft]
19/04 . . . comprising a rack
19/043 . . . [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]
2019/046 . . . [Facilitating the engagement or stopping of racks]
19/06 . . . comprising (flexible members, e.g. an) endless flexible member

WARNING
Groups F16H 19/0604 - F16H 19/0672 are not complete pending reclassification; see also this group
19/0604 . . . [with means to double or half the stroke of the reciprocating member]
19/0609 . . . [the reciprocating motion being created by at least one drum or pulley with different diameters, using a differential effect]
19/0613 . . . [the flexible member being a toothed belt or chain engaging a rack]
19/0618 . . . [the flexible member, e.g. cable, being wound on a drum or thread for creating axial movement parallel to the drum]
19/0622 . . . [for converting reciprocating movement into oscillating movement and vice versa, the reciprocating movement is perpendicular to the axis of oscillation]
19/0628 . . . [the flexible member, e.g. a cable, being wound with one string to a drum and unwound with the other string to create reciprocating movement of the flexible member]
19/0636 . . . [the flexible member being a non-buckling chain]
19/064 . . . [the flexible push member uses a bended profile to generate stiffness, e.g. spreading belts]
19/0645 . . . [the flexible push or pull member having guiding means, i.e. the flexible member being supported at least partially by a guide to transmit the reciprocating movement (non-buckling chains F16H 19/0636)]
19/065 . . . [with flexible members between discs creating reciprocation by relative rotation of the discs]
19/0654 . . . [using twisting movement of flexible members to modify the axial length of the mechanism]
19/0659 . . . [combined with means for creating non-linear characteristics, e.g. cams; Means for creating different velocity on forward and reverse stroke]
19/0663 . . . [with telescopic means, e.g. for supporting or shielding the reciprocating member]
19/0668 . . . [with open loop, e.g. with the free ends of the flexible member fixed to the casing, e.g. when the drive means are arranged on the carriage]
19/0672 . . . [characterised by means for tensioning the flexible member]
19/0677 . . . [characterised by the means for fixing the flexible member to a drum]
19/0681 . . . [the flexible member forming a closed loop]
19/0686 . . . [the flexible member being directly driven by a pulley or chain wheel]
19/069 . . . [with means for generating two superposed movements, e.g. for driving a X-Y table]
19/0695 . . . [Generating pivoting movement of a joint]
19/08 . . . for interconverting rotary motion and oscillating motion

CPC - 2020.05
Gearing for conveying or converting motion by means of levers, links, or cams (combination of gearings of different types F16H 37/00)

21/00 Gearings comprising primarily only links or levers, with or without slides
21/02 the movements of two or more independently-moving members being combined into a single movement
21/04 Guiding mechanisms, e.g. for straight-line guidance (for drawing-machines B43L)
21/06 which can be made ineffective when desired
21/08 by pushing a reciprocating rod out of its operative position
21/10 all movement being in or parallel to a single plane
21/12 for conveying rotary motion
21/14 by means of cranks, eccentrics, or like members fixed to one rotary member and guided along tracks on the other
21/16 for interconverting rotary motion and reciprocating motion
21/18 Crank gearings; Eccentric gearings
21/20 with adjustment of throw (adjustable cranks or eccentrics F16C 3/28; adjustable connecting-rods F16C 7/06)
21/22 with one connecting-rod and one guided slide to each crank or eccentric
21/24 without further links or guides
21/26 with toggle action
21/28 with cams or additional guides
21/30 with members having rolling contact
21/32 with additional members comprising only pivoted links or arms
21/34 with two or more connecting-rods to each crank or eccentric
21/36 without swinging connecting-rod, e.g. with epicyclic parallel motion, slot and crank motion
21/365 with planetary gearing having a ratio of 2:1 between sun gear and planet gear
21/38 with means for temporary energy accumulation, e.g. to overcome dead-centre positions
21/40 for interconverting rotary motion and oscillating motion
21/42 with adjustable throw
21/44 for conveying or interconverting oscillating or reciprocating motions
21/46 with movements in three dimensions
21/48 for conveying rotary motions
21/50 for interconverting rotary motion and reciprocating motion (F16H 23/00 takes precedence)
21/52 for interconverting rotary motion and oscillating motion
21/54 for conveying or interconverting oscillating or reciprocating motions

23/00 Wobble-plate gearings; Oblique-crane gearings (conveying rotary motion with toothed nutating gears F16H 3/321)

23/02 with adjustment of throw by changing the position of the wobble-member (F16H 29/04, F16H 33/10 takes precedence)
23/04 with non-rotary wobble-members
23/06 with sliding members hinged to reciprocating members
23/08 connected to reciprocating members by connecting-rods
23/10 with rotary wobble-plates with plane surfaces

25/00 Gearings comprising primarily only cams, cam-followers and screw-and-nut mechanisms
25/02 the movements of two or more independently moving members being combined into a single movement
25/04 for conveying rotary motion
25/06 with intermediate members guided along tracks on both rotary members
25/063 [the intermediate members being balls engaging on opposite cam discs]
25/066 [the intermediate members being rollers supported in a chain]
25/08 for interconverting rotary motion and reciprocating motion (F16H 23/00 takes precedence)
25/10 with adjustable throw (adjustable cams F16H 53/04)
25/12 with reciprocation along the axis of rotation, e.g. gearings with helical grooves and automatic reversal, (or cams) (screw mechanisms without automatic reversal F16H 25/20)
25/122 [Gearings with helical grooves and automatic reversal]
25/125 [having the cam on an end surface of the rotating element]
25/127 [using electric solenoids for generating the reciprocating motion]
25/14 with reciprocation perpendicular to the axis of rotation (F16H 21/36 takes precedence)
25/16 for interconverting rotary motion and oscillating motion
25/18 for conveying or interconverting oscillating or reciprocating motions
25/183 [conveying only reciprocating motion, e.g. wedges]
25/186 [with reciprocation along the axis of oscillation]
25/20 Screw mechanisms (with automatic reversal F16H 25/12)
25/203 [with arrangements for taking up backlash (F16H 25/2209 takes precedence)]
25/206 [with more than one nut or with nuts consisting of more than one bearing part]
25/209 [with radial preloading]
25/2012 [using a spring member creating rotary torque for counter rotating the two nuts, e.g. a torsion bar]
25/2015 [Means specially adapted for stopping actuators in the end position; Position sensing means]
25/2018 [with both screw and nut being driven, i.e. screw and nut are both rotating]
25/2021 [with means for avoiding overloading]
25/2025 [with means to disengage the nut or screw from their counterpart; Means for connecting screw and nut for stopping reciprocating movement (F16H 25/2015 takes precedence)
Gearing for conveying or converting motion by means of levers, links, or cams

25/2285 . . . . . (with rings engaging the screw shaft with the inner perimeter, e.g. using inner rings of a ball bearing)

25/2226 . . . . . (using roller spacers, i.e. spacers separating the rollers, e.g. by forming a complete chain)

25/2257 . . . . . (with means for shifting planetary rollers axially, e.g. into central position)

25/2261 . . . . . (arranged substantially perpendicular to the screw shaft axis)

25/2266 . . . . . (arranged substantially in parallel to the screw shaft axis (planetary rollers F16H 25/2252))

25/2253 . . . . . (with elements for guiding circulating members)

25/2260 . . . . . (with means for guiding circulating members)

25/2247 . . . . . (with rollers)

25/2252 . . . . . (Planetary rollers between nut and screw)

25/2209 . . . . . (using worm gears)

25/2218 . . . . . (Screw seals, wipers, scrapers or the like)

25/2247 . . . . . (Brakes; Rotational locks)

25/2270 . . . . . (using a wrap spring brake, i.e. a helical wind up spring for braking or locking)

25/2248 . . . . . (special features for facilitating the manufacturing of spindles, nuts, or sleeves of screw devices)

25/2295 . . . . . (Rings which are inclined or can pivot around an axis perpendicular to the screw shaft axis)

25/2288 . . . . . (Screw mechanisms having rollers being supported by the screw shaft and engaging the nut)

25/2254 . . . . . (one of the threads being replaced by elements specially formed for engaging the screw or nut, e.g. pins, racks, toothed belts)

25/2284 . . . . . (Perpendicular arrangement of drive motor to screw axis)

25/2204 . . . . . (with balls)

25/2238 . . . . . (using ball spacers, i.e. spacers separating the balls, e.g. by forming a chain supporting the balls)

25/2209 . . . . . (with arrangements for taking up backlash)

25/2222 . . . . . (Cross over deflectors between adjacent thread turns, e.g. S-form deflectors connecting neighbouring threads)

25/2227 . . . . . (the device for circulation forming a part of the screw member)

25/2214 . . . . . (with elements for guiding the circulating balls)

25/2219 . . . . . (Axially mounted end-deflectors)

25/2223 . . . . . (with cages or means to hold the balls in position)

25/2220 . . . . . (with endless flexible members)

25/2206 . . . . . (Telescopic screws with at least three screw members in coaxial arrangement)

25/2065 . . . . . (Manual back-up means for overriding motor control, e.g. hand operation in case of failure)

25/2208 . . . . . (Screws in parallel arrangement driven simultaneously with an output member moved by the screws)

25/205 . . . . . (comprising alternate power paths, e.g. for fail safe back-up)

25/2056 . . . . . (Telescopic screws with at least three screw members in coaxial arrangement)

25/2068 . . . . . (Means for returning linear actuator to zero position, e.g. upon occurrence of failure by using a spring)

25/2071 . . . . . (Disconnecting drive source from the actuator, e.g. using clutches for release of drive connection during manual control)

25/2059 . . . . . (Superposing movement by two screws, e.g. with opposite thread direction (telescopic screws with three screw members F16H 25/2056))

25/2062 . . . . . (Arrangements for driving the actuator)

25/2078 . . . . . (the rotor being integrated with the nut or screw body)

25/2084 . . . . . (Perpendicular arrangement of drive motor to screw axis)

25/2087 . . . . . (using planetary gears)

25/209 . . . . . (using worm gears)

25/2049 . . . . . (Special materials or coatings for screws or nuts (lubrication F16H 57/0497))

25/2034 . . . . . (Extruded frame casings)

25/2037 . . . . . (Actuator supports or means for fixing piston end, e.g. flanges)

25/204 . . . . . (Axial sliding means, i.e. for rotary support and axial guiding of nut or screw shaft)

25/2043 . . . . . (Screw mechanisms driving an oscillating lever, e.g. lever with perpendicular pivoting axis)

25/2046 . . . . . (with gears arranged perpendicular to screw shaft axis, e.g. helical gears engaging tangentially the screw shaft)

25/205 . . . . . (with guide and/or means of holding the balls in position)

2025/209 . . . . . (cyclically-varying velocity ratio F16H 35/02; impulse couplings F16D 5/00; impulse couplings F16D 5/00)

2025/2454 . . . . . (Brakes; Rotational locks)

2025/2509 . . . . . (elements for guiding circulating members, e.g. Geneva driven (rotary gearings with cyclically-varying velocity ratio F16H 35/02; impulse couplings F16D 5/00; impulse couplings F16D 5/00))

2025/2509 . . . . . (with one of the threads being replaced by a wire or stripmetal, e.g. spring)

2025/2548 . . . . . (with means for returning linear actuator to zero position, e.g. upon occurrence of failure by using a spring)

2025/2547 . . . . . (with elements for guiding the circulating balls)

2025/2546 . . . . . (using a wrap spring brake, i.e. a helical wind up spring for braking or locking)

2025/2542 . . . . . (with means for returning linear actuator to zero position, e.g. upon occurrence of failure by using a spring)

2025/2541 . . . . . (with one of the threads being replaced by a wire or stripmetal, e.g. spring)

2025/2540 . . . . . (one of the threads being replaced by elements specially formed for engaging the screw or nut, e.g. pins, racks, toothed belts)

2025/2539 . . . . . (elements for guiding circulating members, e.g. Geneva driven (rotary gearings with cyclically-varying velocity ratio F16H 35/02; impulse couplings F16D 5/00; impulse couplings F16D 5/00))

2025/2538 . . . . . (with one of the threads being replaced by a wire or stripmetal, e.g. spring)

2025/2537 . . . . . (with elements for guiding the circulating balls)

2025/2536 . . . . . (one of the threads being replaced by elements specially formed for engaging the screw or nut, e.g. pins, racks, toothed belts)

2025/2535 . . . . . (with one of the threads being replaced by a wire or stripmetal, e.g. spring)}
Gearings with intermittently-driving member

27/04 . . for converting continuous rotation into a step-by-step rotary movement
27/045 . . [Mechanism comprising a member with partially helical tracks]
27/06 . . Mechanisms with driving pins in driven slots, e.g. Geneva drives
27/08 . . with driving toothed gears with interrupted toothing
27/10 . . obtained by means of disengageable transmission members, combined or not combined with mechanisms according to group F16H 27/06 or F16H 27/08

29/00 Gearings for conveying rotary motion with intermittently-driving members, e.g. with freewheel action (freewheels F16D 41/00); Gearings for converting oscillating or reciprocating movement with freewheeling members or other intermittently-driving members into a rotary movement (F16H 31/004)

29/02 . . between one of the shafts and an oscillating or reciprocating intermediate member, not rotating with either of the shafts (F16H 29/20, F16H 29/22 take precedence)
29/04 . . in which the transmission ratio is changed by adjustment of a crank, an eccentric a wobble-plate, or cam, on one of the shafts
29/06 . . with concentric shafts, an annular intermediate member moving around and being supported on an adjustable crank or eccentric
29/08 . . in which the transmission ratio is changed by adjustment of the path of movement, the location of the pivot, or the effective length, of an oscillating connecting member
29/10 . . in which the transmission ratio is changed by directly operating on the intermittently driving members
29/12 . . between rotary driving and driven members (F16H 29/20, F16H 29/22 take precedence)
29/14 . . in which the transmission ratio is changed by adjustment of an otherwise stationary guide member for the intermittently-driving members
29/16 . . in which the transmission ratio is changed by adjustment of the distance between the axes of the rotary members
29/18 . . in which the intermittently-driving members slide along approximately radial guides while rotating with one of the rotary members
29/20 . . the intermittently-acting members being shaped as worms, screws, or racks
29/22 . . with automatic speed change

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

31/001 . . [Mechanisms with freewheeling members]
31/002 . . [Hand-driven ratchets (wrenches of the ratchet type B25B 13/46)]
31/003 . . [Step-by-step mechanisms for rotary motion]
31/004 . . [with pawls driven by a rotary cam]
31/005 . . [with pawls driven by a reciprocating or oscillating transmission member (F16H 31/004 take precedence)]
31/006 . . [with friction means]
31/007 . . [Step-by-step mechanisms for linear motion]
31/008 . . [with friction means]

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

33/02 . . Rotary transmissions with mechanical accumulators, e.g. weights, springs, intermittently-connected flywheels
33/04 . . Gearings for conveying rotary motion with variable velocity ratio, in which self-regulation is sought
33/06 . . . . based essentially on spring action (ratchet slip couplings F16D 7/04)
33/08 . . . . based essentially on inertia
33/10 . . . . . with gyroscopic action, e.g. comprising wobble-plates, oblique cranks
33/12 . . . . . with a driving member connected differentially with both a driven member and an oscillatory member with large resistance to movement, e.g. Constantinesco gearing
33/14 . . . . . having orbital members influenced by regulating masses
33/16 . . . . . which have their own free motion, or consist of fluid
33/18 . . . . . . of which the motion is constrained
33/185 . . . . . . [the masses being fixed to the orbital members]
33/20 . . for interconversion, based essentially on inertia, of rotary motion and reciprocating or oscillating motion [(for converting into a linear propulsion force, i.e. inertia motors F03G 3/00)]

35/00 Gearings or mechanisms with other special functional features

2035/001 . . [Gearings with eccentric mounted gears, e.g. for cyclically varying ratio]
2035/003 . . [Gearings comprising pulleys or toothed members of non-circular shape, e.g. elliptical gears (harmonic drives with elliptical wave generators F16H 49/001)]
2035/005 . . [Gearings or mechanisms preventing back-driving (braking or locking of screw actuators F16H 25/2454)]
2035/006 . . [Gearings or mechanisms for stopping or limiting movement, e.g. stopping a movement after few turns (for linear screw actuators F16H 25/2015)]
35/008 . . . . [for variation of rotational phase relationship, e.g. angular relationship between input and output shaft (couplings F16D 3/10)]
35/02 . . . . . for conveying rotary motion with cyclically varying velocity ratio (speed-changing mechanisms operating cyclically, see the appropriate groups)
35/06 . . . . . Gearings designed to allow relative movement between supports thereof without ill effects (F16H 1/26, F16H 1/48 take precedence; mounting or supporting gearboxes F16H 57/025)
35/08 . . . . . for adjustment of members on moving parts from a stationary place
35/10 . . . . . Arrangements or devices for absorbing overload or preventing damage by overload [(for screw mechanisms F16H 25/2021); couplings for transmitting rotation F16D]
2035/103 . . . . . . [with drive interruption by structural failure of overload preventing means, e.g. using shear pins]
Gearings with intermittently-driving member

2037/047 . . . [Combinations of parallel shaft and orbital motion gearing, wherein the orbital motion gear has more than one connection with the parallel shaft gearing]

2037/049 . . . [Forward-reverse units with forward and reverse gears for achieving multiple forward and reverse gears, e.g. for working machines]

37/06 . . . with a plurality of driving or driven shafts; with arrangements for dividing torque between two or more intermediate shafts

37/065 . . . [with a plurality of driving or driven shafts (F16H 37/08 takes precedence)]

37/08 . . . with differential gearing

37/0806 . . . [with a plurality of driving or driven shafts]

37/0813 . . . [with only one input shaft (differentials for four wheel drive vehicles B60K 17/346)]

37/082 . . . [and additional planetary reduction gears]

37/0826 . . . [with only one output shaft]

37/0833 . . . [with arrangements for dividing torque between two or more intermediate shafts, i.e. with two or more internal power paths (F16H 37/32 takes precedence)]

37/084 . . . [at least one power path being a continuously variable transmission, i.e. CVT]

37/0846 . . . [CVT using endless flexible members]

37/0853 . . . [CVT using friction between rotary members having a first member of uniform effective diameter cooperating with different parts of a second member]

37/086 . . . [CVT using two coaxial friction members cooperating with at least one intermediate friction member]

37/0866 . . . [Power split variators with distributing differentials, with the output of the CVT connected or connectable to the output shaft]

37/0873 . . . . . . . . . . [with switching, e.g. to change ranges]

37/088 . . . . . . . . . . [Power split variators with summing differentials, with the input of the CVT connected or connectable to the input shaft]

37/0886 . . . . . . . . . . [with switching means, e.g. to change ranges]

37/0893 . . . . . . . . . . [characterised in the ratio of the continuously variable transmission is different from zero when the output shaft speed is zero]

37/10 . . . . . . . . . . at both ends of intermediate shafts (F16H 37/0806 takes precedence)

2037/0101 . . . [Power split variators with one differential at each end of the CVT]

2037/0102 . . . [the input or output shaft of the transmission is connected or connectable to two or more differentials]

2037/0103 . . . [Power split variators with each end of the CVT connected or connectable to a Ravigneaux set]

2037/0104 . . . [Power split variators with one end of the CVT connected or connectable to two or more differentials]
Gearings with intermittently-driving member

F16D 31/00 - F16D 39/00; Fluid-resistance brakes F16D 57/00

Fluid gearing (fluid actuators F15B; couplings or clutches with a fluid or semi-fluid as power-transmitting means
F16D 31/00 - F16D 39/00; Fluid-resistance brakes F16D 57/00)

39/00 Rotary fluid gearing using pumps and motors of the volumetric type, i.e. passing a predetermined volume of fluid per revolution ([application to motor vehicles B60K]; application to lifting or pushing equipment B60F; control of exclusively fluid gearing F16H 61/38)

2039/0005 [comprising arrangements or layout to change the capacity of the motor or pump by moving the hydraulic chamber of the motor or pump]

39/01 Pneumatic gearing; Gearing working with subatmospheric pressure (pneumatic hammers B25D 9/00)

39/02 with liquid motors at a distance from liquid pumps

39/04 with liquid motor and pump combined in one unit

39/06 pump and motor being of the same type

39/08 each with one main shaft and provided with pistons reciprocating in cylinders

39/10 with cylinders arranged around and parallel or approximately parallel to the main axis of the gearing

2039/105 [at least one pair of motors or pumps sharing a common swash plate]

39/12 with stationary cylinders

39/14 with cylinders carried in rotary cylinder blocks or cylinder-bearing members

39/16 with cylinders arranged perpendicular to the main axis of the gearing

39/18 the connections of the pistons being at the outer ends of the cylinders

39/20 the connections of the pistons being at the inner ends of the cylinders

39/22 with liquid chambers shaped as bodies of revolution concentric with the main axis of the gearing

39/24 with rotary displacement members, e.g. provided with axially or radially movable vanes passing movable sealing members

39/26 with liquid chambers not shaped as bodies of revolution or shaped as bodies of revolution eccentric to the main axis of the gearing

39/28 with liquid chambers formed in rotary members

39/30 with liquid chambers formed in stationary members

39/32 with sliding vanes carried by the rotor

39/34 in which a rotor on one shaft co-operates with a rotor on another shaft

39/36 toothed-gear type

39/38 Displacement screw-pump type

39/40 Hydraulic differential gearings, e.g. having a rotary input housing with inter-connected liquid chambers for both outputs

39/42 pump and motor being of different types

41/00 Rotary fluid gearing of the hydrokinetic type (control of exclusively fluid gearing F16H 61/38)

41/02 with pump and turbine connected by conduits or ducts

41/04 Combined pump-turbine units

41/22 Gearing systems consisting of a plurality of hydrokinetic units operating alternatively, e.g. made effective or ineffective by filling or emptying or by mechanical clutches

41/24 Details

2041/243 [Connections between pump shell and cover shell of the turbine]

2041/246 [relating to one way clutch of the stator]

41/26 Shape of runner blades or channels with respect to function

41/28 with respect to manufacture, e.g. blade attachment

2041/285 [of stator blades]

41/30 relating to venting, lubrication, cooling, circulation of the cooling medium

41/32 Selection of working fluids (chemical aspects, see the relevant classes)

43/00 Other fluid gearing, e.g. with oscillating input or output ([generating mechanical vibrations of infrasonic or sonic frequency B06B; percussive tools B25D 9/00; mine roof supports for step by step movement E21D 23/00; reciprocating-piston machines without rotary main shaft F01B 11/08; fluid pressure actuators F15B])

43/02 Fluid gearing actuated by pressure waves
Fluid gearing

45/00 Combinations of fluid gearings for conveying rotary motion with couplings or clutches (F16H 41/22, F16H 47/085) take precedence; conjoint control of driveline clutches and change-speed gearing in vehicles B60W 10/02, B60W 10/10 (and B60W 30/18)

47/00 Combinations of mechanical gearing with fluid clutches or fluid gearing (conjunct control of driveline clutches and change-speed gearing in vehicles B60W 10/02, B60W 10/10)

**NOTE**

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

45/02 [comprising a clutch between prime mover and fluid gearing] 47/02 [the fluid gearing being of the volumetric type] 47/04 [the mechanical gearing being of the type with members having orbital motion] 47/06 [the fluid gearing being of the hydrokinetic type] 47/07 [using two or more power-transmitting fluid circuits (F16H 47/065, F16H 47/10)] 47/08 [the mechanical gearing being of the type with members having orbital motion (F16H 47/065 takes precedence)] 47/085 [with at least two mechanical connections between the hydraulic device and the mechanical transmissions] 47/10 [using two or more power-transmitting fluid circuits] 47/12 [the members with orbital motion having vanes interacting with the fluid]

**48/00 Differential gearings (cooling or lubricating of differential gearing F16H 57/04)**

**NOTE**

When classifying in this main group, in the absence of an indication to the contrary, classification is made in all appropriate places.

2048/02 [Transfer gears for influencing drive between outputs]

2048/04 [having unequal torque transfer between two outputs]

48/05 Multiple interconnected differential sets

48/06 with gears having orbital motion

48/08 [comprising bevel gears]

2048/082 [characterised by the arrangement of output shafts]

2048/085 [characterised by shafts or gear carriers for orbital gears]

2048/087 [characterised by the pinion gears, e.g. their type or arrangement]

48/10 with orbital spur gears

2048/102 [with spur gears engaging face gears]

2048/104 [characterised by two ring gears]

2048/106 [characterised by two sun gears]

48/11 having intermeshing planet gears

48/12 without gears having orbital motion

48/14 withcams

48/142 [consisting of linked clutches using axially movable inter-engaging parts]

48/145 [with friction clutching members]

48/147 [with driven cam followers or balls engaging two opposite cams]

48/16 with freewheels

48/18 with fluid gearing

48/19 consisting of two linked clutches

48/20 Arrangements for suppressing or influencing the differential action, e.g. locking devices

2048/201 [with means directly braking the orbital gears]

2048/202 [using freewheel clutches]

2048/204 [Control of arrangements for suppressing differential actions]

2048/205 [using the steering as a control parameter]

2048/207 [using torque sensors]

2048/208 [using flywheels]

48/22 using friction clutches or brakes

48/24 using positive clutches or brakes

48/26 using fluid action, e.g. viscous clutches
Fluid gearing

Details of gearing or mechanisms (of screw-and-nut gearing
F16H 25/00; of fluid gearing F16H 39/00 – F16H 43/00; shafts,
Bowden mechanisms, cranks, eccentrics, bearings, pivotal,
pivotal connections, crossheads, connecting-rods F16C; chains, belts F16G;
piston-rods F16J 7/00)

51/00  Levers of gearing mechanisms ([connecting rods or links pivoted at both ends F16C 7/00; gear levers 
F16H 59/00); manipulating levers G05G)

51/02  adj

53/00  Cams; Non-rotary cams; Cam followers, e.g.
rollers

53/02  . Single-track cams for single-revolution cycles;
Camshafts with such cams

53/025  . [characterised by their construction, e.g.
assembling or manufacturing features (grinding of
camshafts B24B 19/12)]

53/04  . Adjustable cams

53/06  . Cam-followers (F16H 53/08 takes precedence)

53/08  . Multi-track cams, e.g. for cycles consisting of
several revolutions; Cam-followers specially
adapted for such cams

55/00  Elements with teeth or friction surfaces for
conveying motion; Worms; Pulleys; Sheaves
(pulley-blocks B66D 3/04)

55/02  . Toothed members; Worms

55/06  . Use of materials; Use of treatments of toothed
members or worms to affect their intrinsic
material properties (coatings for lubrication
F16H 57/037; producing gear wheels from
plastics or substances in a plastic state
B29D 15/00; heat treatment C21D 9/32;
electrolytic surface treatment C25D; heating by
electromagnetic field H05B 6/00)

2055/065  . [Moulded gears, e.g. inserts therefor]

55/08  . Profiling

55/0806  . [Involute profile]

55/0813  . . . . . . . [Intersecting-shaft arrangement of the
 toothed members]

55/082  . . . . . Skewed-shaft arrangement of the toothed
members, i.e. non-intersecting shafts)

55/0826  . . . . . [Novikov-Wildhaber profile]

55/0833  . . . . . Flexible toothed member, e.g. harmonic
drive

55/084  . . . . . [Non-circular rigid toothed member, e.g.
eliptic gear]

55/0846  . . . . . [Intersecting-shaft arrangement of the toothed
members (F16H 55/0813, F16H 55/082, 
F16H 55/0833, F16H 55/084) take precedence])

55/0853  . . . . . [Skewed-shaft arrangement of the toothed
members (F16H 55/082, F16H 55/0826, 
F16H 55/0833, F16H 55/084) take precedence])

2055/086  . . . . . [Silent gear profiles]

2055/0866  . . . . . [Profiles for improving radial engagement of
gears, e.g. chamfers on the tips of the teeth]

55/0873  . . . . . [for improving axial engagement, e.g. a
chamfer at the end of the tooth flank]

55/088  . . . . . [with corrections on tip or foot of the teeth, e.g.
addendum relief for better approach contact]

55/0886  . . . . . [with corrections along the width, e.g. flank
width crowning for better load distribution]

2055/0893  . . . . . [for parallel shaft arrangement of toothed
members]
Details of gearing or mechanisms

F16H

55/10 . . . . Constructively simple tooth shapes, e.g. shaped as pins, as balls ([gearwork for clocks and watches G04B 13/000])
55/12 . . . . with body or rim assembled out of detachable parts
55/14 . . . . Construction providing resilience or vibration-damping (F16H 55/06 takes precedence; resilient coupling of wheel or wheel-rim with shaft F16D 3/50, F16D 3/80)
55/16 . . . . relating to teeth only
55/17 . . . . Toothed wheels (worm wheels F16H 55/22; chain wheels F16H 55/30)
2055/173 . . . . [Toothed belt pulleys]
55/171 . . . . [Toothed belt pulleys]
55/32 . . . . Friction members (friction surfaces F16D 69/00)
2055/325 . . . . [characterized by roughness or hardness of friction surface]
55/34 . . . . Non-adjustable friction discs
55/36 . . . . Pulleys (with features essential for adjustments F16H 55/52)
2055/363 . . . . [with special means or properties for lateral tracking of the flexible members running on the pulley, e.g. with crowning to keep a belt on track]
2055/366 . . . . [with means providing resilience or vibration damping]
55/38 . . . . Means or measures for increasing adhesion (in general F16D 69/00)
55/40 . . . . with spokes (F16H 55/48 takes precedence)
55/42 . . . . Laminated pulleys
55/44 . . . . Sheet-metal pulleys
55/46 . . . . Split pulleys
55/48 . . . . manufactured exclusively or in part of non-metallic material, e.g. plastics (F16H 55/38, F16H 55/42, F16H 55/46 take precedence {manufacture of wooden wheels B27H 7/000})
55/49 . . . . Features essential to V-belts pulleys
55/50 . . . . Features essential to rope pulleys
55/52 . . . . Pulleys or friction discs of adjustable construction
55/54 . . . . of which the bearing parts are radially adjustable
55/56 . . . . of which the bearing parts are relatively axially adjustable
55/563 . . . . [actuated by centrifugal masses]
55/566 . . . . [only adjustable when pulley is stationary]

57/00 General details of gearing (of screw-and-nut gearing F16H 25/08; of fluid gearing F16H 39/00 - F16H 43/00)
57/0006 . . . . [Vibration-damping or noise reducing means specially adapted for gearings (devices for varying tension of belts, ropes or chains with damping means F16H 7/0829; toothed members with construction providing vibration damping F16H 55/14; reducing vibrations or noise of the gearbox casing F16H 57/028; suppression of vibrations or noise of gear selectors F16H 59/0208; control of hydrostatic fluid gearing preventing or reducing vibrations or noise F16H 61/4183)]
57/0012 . . . . [for reducing drive line oscillations]
57/0018 . . . . [Shaft assemblies for gearings (camshafts with single track cams F16H 53/02)]
57/0025 . . . . [with gearing elements rigidly connected to a shaft, e.g. securing gears or pulleys by specially adapted splines, keys or methods]
57/0031 . . . . [with gearing elements rotatable supported on the shaft (F16H 57/021 takes precedence)]
57/0037 . . . . [Special features of coaxial shafts, e.g. relative support thereof]
2057/0043 . . . . [Mounting or adjusting transmission parts by robots]
2057/005 . . . . [Mounting preassembled units, i.e. using pre-mounted structures to speed up final mounting process (mounting of gears or shafts in a gearbox F16H 57/022)]
2057/0056 . . . . [Mounting parts arranged in special position or by special sequence, e.g. for keeping particular parts in his position during assembly]
2057/0062 . . . . [Tools specially adapted for assembly of transmissions]
2057/0068 . . . . [Repairing of transmissions by using repair kits (for gear wheels F16H 205/175)]
2057/0075 . . . . [Modifying standard transmissions from manufacturer, e.g. by adding an extension for additional ratios (for control F16H 2061/0062)]
2057/0081 . . . . [Fixing of, or adapting to transmission failure (detecting transmission failures F16H 205/018)]
2057/0087 . . . . [Computer aided design [CAD] specially adapted for gearings features (computer aided design per se G06F 3/000); Analysis of gear systems]
2057/0093 . . . . [Means or measures for transport, shipping or packaging]
57/01 . . . . Monitoring wear or stress of transmission elements, e.g. for triggering maintenance
2057/012 . . . . [of gearings]
2057/014 . . . . [of friction elements in transmissions]
NOTE
When classifying in this group, in the absence of an indication to the contrary, classification is made in all appropriate subgroups.

Details of gearing or mechanisms
F16H

2057/0225 . . . . . [Assembly method measuring first tolerances or position and selecting mating parts accordingly, e.g. special sized shims for transmission bearings]

2057/0228 . . . . . [Mounting with rough tolerances and fine adjustment after assembly]

57/023 . . . . Mounting or installation of gears or shafts in the gearbox casing, e.g. methods or means for assembly

2057/0235 . . . . [specially adapted to allow easy accessibility and repair (using repair kits F16H 2057/0068)]

57/025 . . . . Support of transmission casing, e.g. torque arms, or attachment to other devices (mounting of transmissions in vehicles B60K 12/00)

57/027 . . . . Means for venting gearboxes, e.g. air breathers

57/028 . . . . characterised by means for reducing vibration or noise

57/029 . . . . characterised by means for sealing the gearbox casing, e.g. to improve airtightness

57/03 . . . . characterised by means for reinforcing gearboxes, e.g. ribs

57/031 . . . . characterised by covers or lids for gearboxes

57/032 . . . . characterised by the materials used

2057/0325 . . . . [Moulded casings made from plastic]

57/033 . . . . Series gearboxes, e.g. gearboxes based on the same design being available in different sizes or gearboxes using a combination of several standardised units

2057/0335 . . . . [Series transmissions of modular design, e.g. providing for different transmission ratios or power ranges]

57/035 . . . . Gearboxes for transmissions with endless flexible members

57/037 . . . . Gearboxes for accommodating differential gearings (rotating cases for differential gearings F16H 48/40)

57/038 . . . . Gearboxes for accommodating bevel gears (F16H 57/037 takes precedence)

57/039 . . . . Gearboxes for accommodating worm gears

57/04 . . . . Features relating to lubrication or cooling [or heating] ([in hydrokinetic gearing F16H 41/30:) control of lubrication or cooling in hydrostatic gearing F16H 61/4165]

57/0401 . . . . [using different fluids, e.g. a traction fluid for traction gearing and a lubricant for bearings or reduction gears]

57/0402 . . . . [Cleaning of lubricants, e.g. filters or magnets]

57/0404 . . . . [Lubricant filters]

57/0405 . . . . [Monitoring quality of lubricant or hydraulic fluids]

57/0406 . . . . [Absorption elements for lubricants, e.g. oil felt]

57/0408 . . . . [Exchange, draining or filling of transmission lubricant]

57/0409 . . . . [characterised by the problem to increase efficiency, e.g. by reducing splash losses]

57/041 . . . . [Coatings or solid lubricants, e.g. antiseize layers or pastes]

57/0412 . . . . [Cooling or heating: Control of temperature]

57/0413 . . . . [Controlled cooling or heating of lubricant; Temperature control therefor]

57/0415 . . . . [Air cooling or ventilation; Heat exchangers; Thermal insulations]

57/0416 . . . . [Air cooling or ventilation]
Details of gearing or mechanisms

57/0417 . . . . [Heat exchangers adapted or integrated in the gearing]
57/0419 . . . . [Thermal insulations]
57/042 . . . . [Guidance of lubricant]
57/0421 . . . . [on or within the casing, e.g. shields or baffles for collecting lubricant, tubes, pipes, grooves, channels or the like]
57/0423 . . . . [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 F16H 57/0426; lubrication by injection, injection nozzles or tubes therefore F16H 57/0456)]
57/0424 . . . . [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 F16H 57/0426)]
57/0426 . . . . [Means for guiding lubricant into an axial channel of a shaft]
57/0427 . . . . [on rotary parts, e.g. using baffles for collecting lubricant by centrifugal force]
57/0428 . . . . [Grooves with pumping effect for supplying lubricants]
57/043 . . . . . . . . [within rotary parts, e.g. axial channels or radial openings in shafts]
57/0431 . . . . [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]
57/0432 . . . . [Lubricant guiding means on or inside shift rods or shift forks (shift rods or shift forks to be lubricated, cooled or heated F16H 50468)]
57/0434 . . . . [relating to lubrication supply, e.g. pumps (arrangement of pumps F16H 57/0441); Pressure control (grooves with pumping effect for supplying lubricant F16H 57/0428; generation and variation of line pressure for transmission control F16H 61/0021)]
57/0435 . . . . [Pressure control for supplying lubricant; Circuits or valves therefor]
57/0436 . . . . [Pumps]
57/0438 . . . . [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]
57/0439 . . . . [using multiple pumps with different power sources or a single pump with different power sources, e.g. one and the same pump may selectively be driven by either the engine or an electric motor]
57/0441 . . . . [Arrangements of pumps]
57/0442 . . . . [for supply in case of failure, i.e. auxiliary supply]
57/0443 . . . . [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]
57/0445 . . . . [for supply of different gearbox casings or sections]
57/0446 . . . . [the supply forming part of the transmission control unit, e.g. for automatic transmissions]
57/0447 . . . . [Control of lubricant levels, e.g. lubricant level control dependent on temperature]
57/0449 . . . . [Sensors or indicators for controlling the fluid level]
57/045 . . . . [Lubricant storage reservoirs, e.g. reservoirs in addition to a gear sump for collecting lubricant in the upper part of a gear case]
57/0452 . . . . [Oil pans]
57/0453 . . . . [Section walls to divide a gear sump]
57/0454 . . . . [Sealings between different partitions of a gearing or to a reservoir (means for sealing gearboxes F16H 57/029)]
57/0456 . . . . [Lubrication by injection; Injection nozzles or tubes therefor (oil mist or spray lubrication F16H 57/0458)]
57/0457 . . . . [Splash lubrication (characterised by the problem reducing losses, e.g. splash losses F16H 57/0409)]
57/0458 . . . . [Oil-mist or spray lubrication; Means to reduce foam formation (reducing foam formation by venting F16H 57/027)]
57/046 . . . . [Oil-mist or spray lubrication]
57/0461 . . . . [Means to reduce foam formation]
57/0463 . . . . [Grease lubrication; Drop-feed lubrication]
57/0464 . . . . [Grease lubrication]
57/0465 . . . . [Drop-feed lubrication]
57/0467 . . . . [Elements of gearings to be lubricated, cooled or heated]
57/0468 . . . . [Shift rods or shift forks]
57/0469 . . . . [Bearings or seals]
57/047 . . . . [Bearing]
57/0472 . . . . [Seals]
57/0473 . . . . [Friction devices, e.g. clutches or brakes]
57/0475 . . . . [Engine and gearing, i.e. joint lubrication or cooling or heating thereof (electric machines and gearing F16H 57/0476)]
57/0476 . . . . [Electric machines and gearing, i.e. joint lubrication or cooling or heating thereof]
57/0478 . . . . [Synchrophasers]
57/0479 . . . . [Gears or bearings on planet carriers]
57/048 . . . . [Type of gearings to be lubricated, cooled or heated]
57/0482 . . . . [Gearings with gears having orbital motion]
57/0483 . . . . [Axle or inter-axle differentials]
57/0484 . . . . [with variable gear ratio or for reversing rotary motion]
57/0486 . . . . [with fixed gear ratio (differentials F16H 57/0483)]
57/0487 . . . . [Friction gearings]
57/0489 . . . . [with endless flexible members, e.g. belt CVTs]
57/049 . . . . [of the toroid type]
57/0491 . . . . [of the cone ring type]
57/0493 . . . . [Gearings with spur or bevel gears (differentials with spur or bevel gears F16H 57/0483)]
57/0494 . . . . [with variable gear ratio or for reversing rotary motion]
57/0495 . . . . [with fixed gear ratio]
57/0497 . . . . [Screw mechanisms]
57/0498 . . . . [Worm gearings]
57/05 . . . . . . . . . . . . of chains (for conveyors B65G 45/02)
57/08 . . . . . . . . . . . . of gearings with members having orbital motion
57/082 . . . . . . . . . . . . [Planet carriers]
2057/085 . . . . . . . . . . . . [Bearings for orbital gears]
Details of gearing or mechanisms

F16H

2057/087 . . . {Arrangement and support of friction devices in planetary gearings, e.g. support of clutch drums, stacked arrangements of friction devices (see also arrangements for shifting planetary gears F16H 3/62, F16H 63/026)}

57/10 . . . Braking arrangements

57/12 . . . Arrangements for adjusting or for taking-up backlash not provided for elsewhere

57/121 . . . {using parallel torque paths and means to twist the two path against each other}

57/122 . . . {by using two independent drive sources, e.g. electric motors}

57/123 . . . {using electric control means}

57/125 . . . {Adjustment of backlash during mounting or assembly of gearing}

57/126 . . . {Self-adjusting during operation, e.g. by a spring}

57/127 . . . {using springs}

57/128 . . . {using axial positioning of gear wheel with addendum modification on gear width, i.e. backlash is compensated by axial positioning of a slightly conical gear wheel}

Control of gearings conveying rotary motion

NOTES

1. Attention is drawn to the Notes after the title of subclass B60W.

2. In groups F16H 59/00 - F16H 63/00, clutches positioned within a gearbox are considered as comprising part of the gearings.

3. In groups F16H 59/00 - F16H 63/00, the following terms or expressions are used with the meaning indicated:
   • "final output element" means the final element which is moved to establish a gear ratio, i.e. which achieves the linking between two power transmission means, e.g. reverse idler gear, gear cluster, coupling sleeve, apply piston of a hydraulic clutch;
   • "mechanism" means a kinematic chain consisting either of a single element or alternatively of a series of elements, the position of each point on the kinematic chain being derivable from the position of any other point on the chain, and therefore, for a given position of a point on one of the elements forming the kinematic chain there is only one position for each of the other points on the 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 element.
   • ["mechanical force" means the force transmitted by an actuating mechanism or the human body]

4. Combinations of features individually covered by group F16H 61/00 and one or both of groups F16H 59/00 and F16H 63/00 are classified in group F16H 61/00.

5. Combinations of features individually covered by groups F16H 59/00 and F16H 63/00 are classified in group F16H 63/00.

6. When classifying in groups F16H 59/00 - F16H 63/00, control inputs or types of gearing, which are not identified by the 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 F16H 61/06 relating to the type of gearing controlled or from group F16H 59/00 relating to control inputs

59/00 Control inputs to [control units of] change-speed-, or reversing-gearings for conveying rotary motion

2059/003 . . . {Detecting or using driving style of a driver, e.g. for adapting shift schedules}

2059/006 . . . {Overriding automatic control}

59/02 . . . Selector apparatus

NOTE

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

59/0204 . . . {for automatic transmissions with means for range selection and manual shifting, e.g. range selector with tiptronic}

59/0208 . . . {with means for suppression of vibrations or reduction of noise}

59/0213 . . . {with sealing means, e.g. against entry of dust}

59/0217 . . . {with electric switches or sensors not for gear or range selection, e.g. for controlling auxiliary devices [for gear selection F16H 59/044; for range selection F16H 59/102]}

2059/0221 . . . {for selecting modes, i.e. input device (for selecting between different modes with range selector F16H 2059/082; for conjoint control B60W 30/182)}

2059/0226 . . . {for selecting particular shift speeds, e.g. a fast shift speed with aggressive gear change}

2059/023 . . . {Selectors for gearings using voice control (for vehicle control B60R 16/0373)}

2059/0234 . . . {Selectors for gearings using foot control}

2059/0239 . . . {Up- and down-shift or range or mode selection by repeated movement (mechanical step by step selection devices F16H 63/14)}

2059/0243 . . . {with push buttons, e.g. shift buttons arranged on steering wheel (range selection with push buttons F16H 59/12)}

2059/0247 . . . {with lever or paddle behind steering wheel}

2059/0252 . . . {with means for initiating skip or double gear shifts, e.g. by moving selection lever beyond a threshold}

2059/0256 . . . {Levers for forward-reverse selection only, e.g. for working machines having a separate lever for switching between forward and reverse mode}

2059/026 . . . {Details or special features of the selector casing or lever support (for mechanical gear shifting F16H 59/042)}

2059/0265 . . . {Selector lever support with pivot axis offset, e.g. support by four bar linkage to create pivoting centre outside the mechanism}

2059/0269 . . . {Ball joints or spherical bearings for supporting the lever}

2059/0273 . . . {Cardan or gimbal type joints for supporting the lever}

59/0278 . . . {Construcational features of the selector lever, e.g. grip parts, mounting or manufacturing}

2059/0282 . . . {Lever handles with lock mechanisms, e.g. for allowing selection of reverse gear or releasing lever from park position}

2059/0286 . . . {with range or splitter selector on selector lever}
Control of gearings conveying rotary motion

2059/0291 . . . [comprising safety means for preventing injuries in case of accidents]
2059/0295 . . . [with mechanisms to return lever to neutral or datum position, e.g. by return springs]
59/04 . . . Ratio selector apparatus
59/041 . . . [consisting of a final output mechanism, e.g. ratio selector being directly linked to a shiftfork]
59/042 . . . [comprising a final actuating mechanism (multiple final output mechanism in a gearbox F16H 63/08)]
59/044 . . . [consisting of electrical switches or sensors (range selectors with electric switches or sensors F16H 59/105)]
59/045 . . . [consisting of fluid valves]
2059/047 . . . [with essentially straight linear movement for gear selection, e.g. straight selection movement using detent mechanism for improving feeling (up-down shift by repeated movements F16H 2059/0239)]
2059/048 . . . [with means for unlocking select or shift movement to allow access to reverse gear position (particular details of the lever handle F16H 2059/0282)]
59/06 . . . the ratio being infinitely variable
2059/065 . . . [Inching pedals for setting the ratio of an hydrostatic transmission]
59/08 . . . Range selector apparatus
2059/081 . . . [using knobs or discs for rotary range selection]
2059/082 . . . [with different modes]
2059/083 . . . [Overdrive or overdrive cut-off]
2059/084 . . . [Economy mode]
2059/085 . . . [Power mode]
2059/086 . . . [Adaptive mode, e.g. learning from the driver]
2059/087 . . . [Winter mode, e.g. to start on snow or slippery surfaces]
2059/088 . . . [Fast forward-reverse-sequence mode]
59/10 . . . [comprising levers]
59/105 . . . [consisting of electrical switches or sensors]
59/12 . . . [comprising push button devices]
59/14 . . . Inputs being a function of torque or torque demand
59/141 . . . [of rate of change of torque or torque demand]
2059/142 . . . [of driving resistance calculated from weight, slope, or the like]
2059/144 . . . [characterised by change between positive and negative drive line torque, e.g. torque changes when switching between coasting and acceleration]
2059/145 . . . [being a function of power demand of auxiliary devices]
2059/147 . . . [Transmission input torque, e.g. measured or estimated engine torque]
2059/148 . . . [Transmission output torque, e.g. measured or estimated torque at output drive shaft]
59/16 . . . Dynamometric measurement of torque
59/18 . . . dependent on the position of the accelerator pedal
2059/183 . . . [Rate of change of accelerator position, i.e. pedal or throttle change gradient]
2059/186 . . . [Coasting]
59/20 . . . Kickdown
59/22 . . . Idle position
59/24 . . . dependent on the throttle opening
59/26 . . . dependent on pressure
59/28 . . . Gasifier pressure in gas turbines
59/30 . . . Intake manifold vacuum
59/32 . . . Supercharger pressure in internal combustion engines
59/34 . . . dependent on fuel feed
59/36 . . . Inputs being a function of speed
2059/363 . . . [Rate of change of input shaft speed, e.g. of engine or motor shaft]
2059/366 . . . [Engine or motor speed]
59/38 . . . of gearing elements
2059/385 . . . [Turbine speed]
59/40 . . . Output shaft speed
2059/405 . . . [Rate of change of output shaft speed or vehicle speed]
59/42 . . . Input shaft speed
2059/425 . . . [Rate of change of input or turbine shaft speed]
59/44 . . . dependent on machine speed of the machine, e.g. the vehicle
2059/443 . . . [Detecting travel direction, e.g. the forward or reverse movement of the vehicle]
2059/446 . . . [Detecting vehicle stop, i.e. the vehicle is at stand still, e.g. for engaging parking lock]
59/46 . . . dependent on a comparison between speeds
2059/462 . . . [Detecting synchronisation, i.e. speed difference is approaching zero]
2059/465 . . . [Detecting slip, e.g. clutch slip ratio]
2059/467 . . . [of torque converter]
59/48 . . . Inputs being a function of acceleration
59/50 . . . Inputs being a function of the status of the machine, e.g. position of doors or safety belts
2059/503 . . . [Axle-load distribution]
2059/506 . . . [Wheel slip]
59/52 . . . dependent on the weight of the machine, e.g. change in weight resulting from passengers boarding a bus
2059/525 . . . [the machine undergoing additional towing load, e.g. by towing a trailer]
59/54 . . . dependent on signals from the brakes, e.g. parking brakes
59/56 . . . dependent on signals from the main clutch
59/58 . . . dependent on signals from the steering
59/60 . . . Inputs being a function of ambient conditions
2059/605 . . . [Traffic stagnation information, e.g. traffic jams]
59/62 . . . Atmospheric pressure
59/64 . . . Atmospheric temperature
59/66 . . . Road conditions, e.g. slope, slippery
2059/663 . . . [Road slope]
2059/666 . . . [Determining road conditions by using vehicle location or position, e.g. from global navigation systems [GPS]]
59/68 . . . Inputs being a function of gearing status
2059/6807 . . . [Status of gear-change operation, e.g. clutch fully engaged]
2059/6815 . . . [Post shift value of gearing, i.e. calculated or estimated parameters after shift is completed, e.g. estimated output torque after shift is performed]
2059/6823 . . . [Sensing neutral state of the transmission]
2059/6863 . . . [Sensing pressure in control systems or in fluid controlled devices, e.g. by pressure sensors (for hydrostatic transmissions F16H 2059/6861)]
Control of gearings conveying rotary motion

Control functions within (control units of) change-speed- or reversing-gearings for conveying rotary motion; Control of exclusively fluid gearing, friction gearing, gearings with endless flexible members or other particular types of gearing

61/00 Control functions within (control units of) change-speed- or reversing-gearings for conveying rotary motion; Control of exclusively fluid gearing, friction gearing, gearings with endless flexible members or other particular types of gearing

61/0003 (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)

61/0006 (Electronic control units for transmission control, e.g. connectors, casings or circuit boards)

61/0009 (Hydraulic control units for transmission control, e.g. assembly of valve plates or valve units)

2061/0012 (Transmission control for optimising power output of driveline)

2061/0015 (Transmission control for optimising fuel consumptions)

2061/0018 (Transmission control for optimising exhaust emissions)

61/0021 (Generation or control of line pressure)

61/0025 (Supply of control fluid; Pumps therefore)

61/0028 (using a single pump driven by different power sources)

61/0031 (using auxiliary pumps, e.g. pump driven by a different power source than the engine)

2061/0034 (Accumulators for fluid pressure supply; Control thereof)

2061/0037 (characterised by controlled fluid supply to lubrication circuits of the gearing (see also lubrication control F16H 57/0446))

2061/004 (Venting trapped air from hydraulic systems (venting of hydraulic transmissions F16H 61/4174; deaeration or removal of unsolved gas F15B 21/0441))

2061/0043 (Cleaning of hydraulic parts, e.g. removal of an orifice clogging)

2061/0046 (Details of fluid supply channels, e.g. within shafts, for supplying friction devices or transmission actuators with control fluid)

2061/005 (Supply of electric power, e.g. batteries for back up supply)

2061/0053 (Initializing the parameters of the controller)

2061/0056 (Powering down of the controller)

61/0059 (Braking of gear output shaft using simultaneous engagement of friction devices applied for different gear ratios)

2061/0062 (Modifying an existing transmission control from a manufacturer for improvement or adaptation, e.g. by replacing a valve or an electric part)

2061/0065 (Modifying or tuning an existing transmission control for racing, e.g. adaptation of valves for very fast shifting)

2061/0068 (Method or means for testing of transmission controls or parts thereof)

2061/0071 (Robots or simulators for testing control functions in automatic transmission (testing of transmissions G01M 13/02))

2061/0075 (characterised by a particular control method)

2061/0078 (Linear control, e.g. PID, state feedback or Kalman)

2061/0081 (Fuzzy logic)

2061/0084 (Neural networks)

2061/0087 (Adaptive control, e.g. the control parameters adapted by learning)

2061/009 (using formulas or mathematical relations for calculating parameters)

2061/0093 (using models to estimate the state of the controlled object)

2061/0096 (using a parameter map)

61/002 (characterised by the signals used (for shift actuators F16H 61/28, for continuously variable gearings F16H 61/66))

NOTES

1. Control units where gearshift is controlled by an electric circuit, are classified in F16H 61/0202

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 F16H 61/0262 with indexing of the electric features

61/0202 (the signals being electric (F16H 61/04 takes precedence))

61/0204 (for gearshift control, e.g. control functions for performing shifting or generation of shift signal)

61/0206 (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 F16H 61/2807))
Control of gearings conveying rotary motion

61/0209 . . . . [with independent solenoid valves modulating the pressure individually for each clutch or brake]
61/0211 . . . . [characterised by low integration or small number of valves]
61/0213 . . . . [characterised by the method for generating shift signals]
2061/0216 . . . . [Calculation or estimation of post shift values for different gear ratios, e.g. by using engine performance tables]
2061/0218 . . . . [Calculation or estimation of the available ratio range, i.e. possible gear ratios, e.g. for prompting a driver with a display]
2061/022 . . . . [Calculation or estimation of optimal gear ratio, e.g. best ratio for economy drive or performance according driver preference, or to optimise exhaust emissions]
2061/0223 . . . . [Generating of new shift maps, i.e. methods for determining shift points for a schedule by taking into account driveline and vehicle conditions]
2061/0225 . . . . [Modifying of shift maps by manual control, e.g. by learning values from the driver during manual shift mode]
2061/0227 . . . . [Shift map selection, i.e. methods for controlling selection between different shift maps, e.g. to initiate switch to a map for up-hill driving]
2061/023 . . . . [Drive-off gear selection, i.e. optimising gear ratio for drive off of a vehicle]
2061/0232 . . . . [Selecting ratios for bringing engine into a particular state, e.g. for fast warming up or for reducing exhaust emissions]
2061/0234 . . . . [Adapting the ratios to special vehicle conditions]
2061/0237 . . . . [Selecting ratios for providing engine braking]
2061/0239 . . . . [Selecting ratios for preventing or cancelling wheel slip]
2061/0241 . . . . [Adapting the ratio to special transmission conditions, e.g. shifts during warming up phase of transmission when fluid viscosity is high]
2061/0244 . . . . [Adapting the automatic ratio to direct driver requests, e.g. manual shift signals or kick down]
61/0246 . . . . [characterised by initiating reverse gearshift]
61/0248 . . . . [Control units where shifting is directly initiated by the driver, e.g. semi-automatic transmissions (generation of movements for final actuating mechanisms F16H 61/28)]
61/0251 . . . . [Elements specially adapted for electric control units, e.g. valves for converting electrical signals to fluid signals]
2061/0253 . . . . [Details of electro hydraulic valves, e.g. lands, ports, spools or springs]
2061/0255 . . . . [Solenoid valve using PWM or duty-cycle control]
2061/0258 . . . . [Proportional solenoid valve]
2061/026 . . . . [On-off solenoid valve]
61/0262 . . . . [the signals being hydraulic (F16H 61/04 takes precedence)]
61/0265 . . . . [for gearshift control, e.g. control functions for performing shifting or generation of shift signals]
61/0267 . . . . [Layout of hydraulic control circuits, e.g. arrangement of valves (for control of actuators selecting and moving final output members, e.g. shift forks F16H 61/30)]
61/0269 . . . . [characterised by low integration or small number of valves]
61/0272 . . . . [characterised by initiating reverse gearshift]
61/0274 . . . . [Control units where shifting is directly initiated by the driver, e.g. semi-automatic transmissions (generation of movements for final actuating mechanisms F16H 61/28)]
61/0276 . . . . [Elements specially adapted for hydraulic control units, e.g. valves]
2061/0279 . . . . [Details of hydraulic valves, e.g. lands, ports, spools or springs]
2061/0281 . . . . [Rotary shift valves, e.g. with a rotary moveable spool for supply of fluid to different channels]
61/0283 . . . . [Governor valves]
61/0286 . . . . [Manual valves]
2061/0288 . . . . [Relay valve, e.g. valve arranged between shift valve and servo]
61/029 . . . . [Throttle valves]
61/0293 . . . . [the signals being purely mechanical]
61/0295 . . . . [Automatic gear shift control, e.g. initiating shift by centrifugal forces]
61/0297 . . . . [Gear shift control where shifting is directly initiated by the driver, e.g. semi-automatic transmissions]
61/04 . . . . [Smoothing ratio shift]
61/0403 . . . . [Synchronisation before shifting]
2061/0407 . . . . [by control of clutch in parallel torque path]
2061/0411 . . . . [by control of shaft brakes]
2061/0414 . . . . [by retarder control]
2061/0418 . . . . [by using different synchronisation devices simultaneously, e.g. for faster synchronisation]
2061/0422 . . . . [by an electric machine, e.g. by accelerating or braking the input shaft]
2061/0425 . . . . [Bridging torque interruption]
2061/0429 . . . . [by torque supply with a clutch in parallel torque path]
2061/0433 . . . . [by torque supply with an electric motor]
61/0437 . . . . [by using electrical signals (F16H 61/0403 and F16H 61/061 take precedence)]
2061/044 . . . . [when a freewheel device is disengaged or bridged]
2061/0444 . . . . [during fast shifting over two gearsteps, e.g. jumping from fourth to second gear]
2061/0448 . . . . [using a particular sequence of gear ratios or friction members]
2061/0451 . . . . [during swap-shifts, i.e. gear shifts between different planetary units, e.g. with double transitions shift involving three or more friction members]
2061/0455 . . . . [during shifts involving three or more shift members, e.g. release of 3-4 clutch, 2-4 brake and apply of forward clutch C1]
2061/0459 . . . . [using map for shift parameters, e.g. shift time, slip or pressure gradient, for performing controlled shift transition and adapting shift parameters by learning]
2061/0462 . . . . [by controlling slip rate during gear shift transition]
Control of gearings conveying rotary motion

2061/0466 . . . (Smoothing shift shock by apply or release of band brake servos, e.g. overlap control of band brake and a clutch or vice versa)

2061/047 . . . (by preventing or solving a tooth butt situation upon engagement failure due to misalignment of teeth)

2061/0474 . . . (by smoothing engagement or release of positive clutches; Methods or means for shock free engagement of dog clutches (for tooth butt situations F16H 2061/047))

2061/0477 . . . (by suppression of excessive engine flare or turbine racing during shift transition (engine flare caused by lock-up release F16H 61/143))

2061/0481 . . . (during range shift from drive (D) or reverse (R) to neutral (N))

2061/0485 . . . (during range shift from neutral (N) to reverse (R))

2061/0488 . . . (during range shift from neutral (N) to drive (D))

2061/0492 . . . (for high engine torque, e.g. during acceleration or uphill driving)

2061/0496 . . . (for low engine torque, e.g. during coasting, sailing or engine braking)

61/06 . . . by controlling rate of change of fluid pressure

61/061 . . . (using electric control means)

2061/062 . . . (for controlling filling of clutches or brake servos, e.g. fill time, fill level or pressure during filling)

2061/064 . . . (for calibration of pressure levels for friction members, e.g. by monitoring the speed change of transmission shafts)

61/065 . . . (using fluid control means)

61/067 . . . (using an accumulator)

61/068 . . . (using an orifice control valve (F16H 61/067 takes precedence))

61/08 . . . Timing control

2061/085 . . . (Timing of auxiliary gear shifts)

61/10 . . . Controlling shift hysteresis

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

2061/1204 . . . (for malfunction caused by simultaneous engagement of different ratios resulting in transmission lock state or tie-up condition (lock state for braking F16H 61/0059))

2061/1208 . . . (with diagnostic check cycles; Monitoring of failures)

2061/1212 . . . (Plausibility checks; Counting means for repeated failures)

2061/1216 . . . (Display or indication of detected failures)

2061/122 . . . (Avoiding failures by using redundant parts)

2061/1224 . . . (Adapting to failures or work around with other constraints, e.g. circumvention by avoiding use of failed parts)

2061/1228 . . . (Fixing failures by repairing failed parts, e.g. loosening a sticking valve)

2061/1232 . . . (Bringing the control into a predefined state, e.g. giving priority to particular actuators or gear ratios)

2061/1236 . . . (using fail priority valves)

2061/124 . . . (Limiting the input power, torque or speed)

2061/1244 . . . (Keeping the current state)

2061/1248 . . . (Resuming normal operation)

2061/1252 . . . (Fail safe valves (fail priority valves F16H 2061/1236))

2061/1256 . . . (characterised by the parts or units where malfunctioning was assumed or detected)

2061/126 . . . (the failing part is the controller)

2061/1264 . . . (Hydraulic parts of the controller, e.g. a sticking valve or clogged channel)

2061/1268 . . . (Electric parts of the controller, e.g. a defect solenoid, wiring or microprocessor)

2061/1272 . . . (the failing part is a part of the final output mechanism, e.g. shift rods or forks)

2061/1276 . . . (the failing part is a friction device, e.g. clutches or brakes)

2061/128 . . . (the main clutch)

2061/1284 . . . (the failing part is a sensor)

2061/1288 . . . (the failing part is an actuator)

2061/1292 . . . (the failing part is the power supply, e.g. the electric power supply)

2061/1296 . . . (the failing part is an electric machine forming part of the transmission)

61/14 . . . Control of torque converter lock-up clutches

61/141 . . . (using means only actuated by centrifugal force)

61/142 . . . (the means being hydraulic valves)

61/143 . . . (using electric control means)

2061/145 . . . (for controlling slip, e.g. approaching target slip value)

2061/146 . . . (for smoothing gear shift shock)

2061/147 . . . (during engine braking, e.g. to attenuate gear clunk when torque direction is changed)

61/148 . . . (using mechanical control means)

61/16 . . . Inhibiting (or initiating) shift during unfavourable conditions, e.g. preventing forward reverse shift at high vehicle speed, preventing engine over speed (unintentional control input F16H 61/18)

2061/161 . . . (by checking feasibility of shifts, i.e. determine if requested shift can be successfully completed and post shift values are in an acceptable range)

2061/163 . . . (Holding the gear for delaying gear shifts under unfavorable conditions, e.g. during cornering)

2061/165 . . . (Preventing reverse gear shifts if vehicle speed is too high for safe shifting)

2061/166 . . . (Preventing or initiating shifts for preventing stall or overspeed of engine)

2061/168 . . . (Forced shifts into neutral for safety reasons, e.g. in case of transmission failure or emergency braking)

61/18 . . . Preventing unintentional or unsafe shift, e.g. preventing manual shift from highest gear to reverse gear)

2061/185 . . . (Means, e.g. catches or interlocks, for preventing unintended shift into reverse gear)

61/20 . . . Preventing gear creeping (Transmission control during standstill, e.g. hill hold control)

2061/202 . . . (Active creep control for slow driving, e.g. by controlling clutch slip)

2061/205 . . . (Hill hold control, e.g. with torque converter or a friction device slightly engaged to keep vehicle stationary)

2061/207 . . . (by neutral control)

61/21 . . . Providing engine brake control

2061/213 . . . (for emergency braking, e.g. for increasing brake power in emergency situations)

2061/216 . . . (by using exhaust brakes)
Control of gearings conveying rotary motion

NOTES

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

61/28 . with at least one movement of the final actuating mechanism being caused by a non-mechanical force, e.g. power-assisted
61/2807 . . {using electric control signals for shift actuators, e.g. electro-hydraulic control therefor (F16H 61/30, F16H 61/32 take precedence; methods for generating shift signals F16H 61/0213)}
61/2815 . . . {with a control using only relays and switches}.
61/2823 . . . {Controlling actuator force way characteristic, i.e. controlling force or movement depending on the actuator position, e.g. for adapting force to synchronisation and engagement of gear clutch}
61/283 . . . {Adjustment or calibration of actuator positions, e.g. neutral position}
61/2838 . . . {Arrangements with single drive motor for selecting and shifting movements, i.e. one motor used for generating both movements}
61/2846 . . . {Arrangements of actuators for enabling jump shifting for skipping of gear ratios}
61/2853 . . . {Electromagnetic solenoids}
61/2861 . . . {Linear motors}
61/2869 . . . {Cam or crank gearing}
61/2876 . . . {Racks}
61/2884 . . . {Screw-nut devices}
61/2892 . . . {other gears, e.g. worm gears, for transmitting rotary motion to the output mechanism}
61/30 . . . {Hydraulic (or pneumatic) motors (or related fluid control means) therefor
61/301 . . . {for power assistance, i.e. servos with follow up action}
61/302 . . . . {with variable force amplification, e.g. force is depending on selected gear or on actuator force (non-linear amplification)}
61/304 . . . {using telemotors, i.e. systems with master cylinder and linked shift actuator without external pressure source}
61/305 . . . {Accumulators for fluid supply to the servo motors, or control thereof}
61/307 . . . . {Actuators with three or more defined positions, e.g. three position servos}
61/308 . . . {Modular hydraulic shift units, i.e. preassembled actuator units for select and shift movements adapted for being mounted on transmission casing}
61/31 . . . . Electric motors (actuators or related electrical control means) therefor
61/323 . . . . . {for power assistance, i.e. servos with follow up action}
61/326 . . . . . {Actuators for range selection, i.e. actuators for controlling the range selector or the manual range valve in the transmission}
61/34 . . . . . comprising two mechanisms, one for the preselection movement, and one for the shifting movement (F16H 61/36 takes precedence)
61/36 . . . . . with at least one movement being transmitted by a cable
61/38 . . . . . Control of exclusively fluid gearing
61/40 . . . . . hydrostatic (involving modification of the gearing
61/4008 . . . . . Control of circuit pressure
61/4017 . . . . . Control of high pressure, e.g. avoiding excess pressure by a relief valve
61/4026 . . . . . Control of low pressure
61/4035 . . . . . Control of circuit flow
61/4043 . . . . . Control of a bypass valve
61/4052 . . . . . by using a variable restriction, e.g. an orifice valve
61/4061 . . . . . Control related to directional control valves, e.g. change-over valves, for crossing the feeding conduits (forward reverse switching by using swash plate F16H 61/438)
61/4069 . . . . . Valves related to the control of neutral, e.g. shut off valves (zero tilt rotation holding means F16H 61/439)
61/4078 . . . . . Fluid exchange between hydrostatic circuits and external sources or consumers
61/4096 . . . . . with pressure accumulators
61/4104 . . . . . Flushing, e.g. by using flushing valves or by connection to exhaust
61/4131 . . . . . Fluid exchange by aspiration from reservoirs, e.g. sump
61/4139 . . . . . Replenishing or scavenging pumps, e.g. auxiliary charge pumps
61/4148 . . . . . Open loop circuits
61/4157 . . . . . Control of braking, e.g. preventing pump overspeeding when motor acts as a pump
61/4165 . . . . . Control of cooling or lubricating
61/4174 . . . . . Control of venting, e.g. removing trapped air
Control of gearings conveying rotary motion

61/4183 . . . Preventing or reducing vibrations or noise, e.g. avoiding cavitations
61/4192 . . . Detecting malfunction or potential malfunction, e.g. fail safe
61/42 . . . involving adjustment of a pump or motor with adjustable output or capacity (F16H 61/46 takes precedence)
61/421 . . . Motor capacity control by electro-hydraulic control means, e.g. using solenoid valves
61/423 . . . Motor capacity control by fluid pressure control means
61/425 . . . Motor capacity control by electric actuators
61/427 . . . Motor capacity control by mechanical control means, e.g. by levers or pedals
61/431 . . . Pump capacity control by electro-hydraulic control means, e.g. using solenoid valves
61/433 . . . Pump capacity control by fluid pressure control means
61/435 . . . Pump capacity control by electric actuators
61/437 . . . Pump capacity control by mechanical control means, e.g. by levers or pedals
61/438 . . . Control of forward-reverse switching, e.g. control of the swash plate causing discharge in two directions (using a directional control valve F16H 61/4061)
61/439 . . . Control of the neutral position, e.g. by zero tilt rotation holding means (using a neutral valve or a shutoff valve F16H 61/4069)
61/44 . . . with more than one pump or motor in operation
61/444 . . . by changing the number of pump or motor units in operation
61/448 . . . Control circuits for tandem pumps or motors
61/452 . . . Selectively controlling multiple pumps or motors, e.g. switching between series or parallel
61/456 . . . Control of the balance of torque or speed between pumps or motors (hydrosstatic differentials F16H 48/18)
61/46 . . . Automatic regulation in accordance with output requirements
61/461 . . . [not involving a variation of the output capacity of the main pumps or motors]
61/462 . . . for achieving a target speed ratio
61/465 . . . for achieving a target input speed
61/468 . . . for achieving a target input torque
61/47 . . . for achieving a target output speed
61/472 . . . for achieving a target output torque
61/475 . . . for achieving a target power, e.g. input power or output power
61/478 . . . for preventing overload, e.g. high pressure limitation
61/48 . . . hydodynamic
61/50 . . . controlled by changing the flow, force, or reaction of the liquid in the working circuit, while maintaining a completely filled working circuit
61/52 . . . by altering the position of blades
61/54 . . . by means of axially-shiftable blade runners
61/56 . . . to change the blade angle
61/58 . . . by change of the mechanical connection of, or between, the runners
61/60 . . . exclusively by the use of freewheel clutches
61/62 . . . involving use of a speed-changing gearing or of a clutch in the connection between runners (F16H 45/02, F16H 61/60 take precedence)
61/64 . . . controlled by changing the amount of liquid in the working circuit
61/66 . . . specially adapted for continuously variable gearings (F16H 61/38 takes precedence)
2061/6601 . . . [with arrangements for dividing torque and shifting between different ranges]
2061/6602 . . . [with at least two dynamo-electric machines for creating an electric power path inside the transmission device, e.g. using generator and motor for a variable power torque path]
2061/6603 . . . [characterised by changing ratio in the mechanical gearing]
2061/6604 . . . [Special control features generally applicable to continuously variable gearings]
2061/6605 . . . [Control for completing downshift applicable to continuously variable gearings]
2061/6607 . . . [Controls concerning lubrication or cooling (lubrication features of friction gearings F16H 5704877)]
2061/6608 . . . [Control of clutches, or brakes for forward-reverse shift]
2061/6609 . . . [Control of clutches or brakes in torque split transmissions]
2061/661 . . . [Conjoint control of CVT and drive clutch]
2061/6611 . . . [Control to achieve a particular driver perception, e.g. for generating a shift shock sensation]
2061/6612 . . . [for engine braking]
2061/6614 . . . [Control of ratio during dual or multiple pass shifting for enlarged ration coverage]
2061/6615 . . . [Imitating a stepped transmissions]
2061/6616 . . . [the shifting of the transmission being manually controlled]
2061/6617 . . . [Manual control of CVTs while continuously varying the ratio]
2061/6618 . . . [Protecting CVTs against overload by limiting clutch capacity, e.g. torque fuse]
61/662 . . . with endless flexible means
2061/66204 . . . [Control for modifying the ratio control characteristic]
2061/66209 . . . [dependent on ambient conditions]
2061/66213 . . . [dependent on driver's choice]
2061/66218 . . . [dependent on control input parameters other than ambient conditions or driver's choice]
2061/6622 . . . [the ratio is varied in order to reduce surface wear of belt or pulley]
61/66222 . . . [controlling shifting exclusively as a function of speed and torque]
61/66227 . . . [controlling shifting exclusively as a function of speed]
61/66231 . . . [using electrical or electronic sensing or control means]
61/6624 . . . [using only hydraulic and mechanical sensing or control means]
61/66245 . . . [using purely mechanical sensing or control means]
61/6625 . . . [controlling shifting exclusively as a function of torque]
Control of gearings conveying rotary motion

61/66254 . . . [controlling of shifting being influenced by a signal derived from the engine and the main coupling]
61/66259 . . . [using electrical or electronical sensing or control means]
61/66263 . . . [using only hydraulical and mechanical sensing or control means]
61/66268 . . . [using purely mechanical sensing or control means]
61/66272 . . . [characterised by means for controlling the torque transmitting capability of the gearing]
2061/66277 . . . [by optimising the clamping force exerted on the endless flexible member]
2061/66281 . . . [by increasing the line pressure at the occurrence of input torque peak]
2061/66286 . . . [Control for optimising pump efficiency]
2061/6629 . . . [Detection of slip for determining level of wear]
2061/66295 . . . [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]
61/664 . . . Friction gearings
2061/6641 . . . [Control for modifying the ratio control characteristic]
2061/6642 . . . [dependent on ambient conditions]
2061/6643 . . . [dependent on driver's choice]
2061/6644 . . . [dependent on control input parameters other than ambient conditions or driver's choice]
61/6645 . . . [controlling shifting exclusively as a function of speed and torque]
61/6646 . . . [controlling shifting exclusively as a function of speed]
61/6647 . . . [controlling shifting exclusively as a function of torque]
61/6648 . . . [controlling of shifting being influenced by a signal derived from the engine and the main coupling]
61/6649 . . . [characterised by the means for controlling the torque transmitting capability of the gearing]
61/68 . . . specially adapted for stepped gearings
61/682 . . . with interruption of drive
61/684 . . . without interruption of drive
61/686 . . . with orbital gears
61/688 . . . with two inputs, e.g. selection of one of two torque-flow paths by clutches
61/70 . . . specially adapted for change-speed gearing in group arrangement, i.e. with separate change-speed gear trains arranged in series, e.g. range or overdrive-type gearing arrangements
61/702 . . . [using electric or electrohydraulic control means]
61/705 . . . [using hydraulic and mechanical control means]
61/707 . . . [using only mechanical control means]
63/00 Control outputs [from the control unit] to change-speed- or reversing-gearings for conveying rotary motion [or to other devices than the final output mechanism]
2063/005 . . . [Preassembled shift units for mounting on gear case (for hydraulic shift units F16H 2061/308)]
63/02 . . . Final output mechanisms therefor; Actuating means for the final output mechanisms
2063/025 . . . [Final output mechanisms for double clutch transmissions]
63/04 . . . a single final output mechanism being moved by a single final actuating mechanism [or of the final output mechanisms F16H 63/30]
63/06 . . . the final output mechanism having an indefinite number of positions
63/062 . . . [electric or electro-mechanical actuating means]
63/065 . . . [hydraulic actuating means]
63/067 . . . [mechanical actuating means]
63/08 . . . Multiple final output mechanisms being moved by a single common final actuating mechanism (of the final output mechanisms F16H 63/30)
63/10 . . . the final actuating mechanism having a series of independent ways of movement, each way of movement being associated with only one final output mechanism
63/12 . . . two or more ways of movement occurring simultaneously
63/14 . . . the final output mechanisms being successively actuated by repeated movement of the final actuating mechanism
63/16 . . . the final output mechanisms being successively actuated by progressive movement of the final actuating mechanism
63/18 . . . the final actuating mechanism comprising cams
63/20 . . . with preselection and subsequent movement of each final output mechanism by movement of the final actuating mechanism in two different ways, e.g. guided by a shift gate
2063/202 . . . [using cam plates for selection or shifting, e.g. shift plates with recesses or groves moved by a selector extension]
2063/204 . . . [the gear shift lever being the immediate final actuating mechanism, e.g. the shift finger being a part of the gear shift lever]
63/206 . . . [the final output mechanisms being mounted coaxially on a single shaft, e.g. mono rail shift mechanism]
2063/208 . . . [using two or more selecting fingers]
63/22 . . . the final output mechanisms being simultaneously moved by the final actuating mechanism
63/24 . . . each of the final output mechanisms being moved by only one of the various final actuating mechanisms [or of the final output mechanisms F16H 63/30]
63/26 . . . some of the movements of the final output mechanisms being caused by another final output mechanism
63/28 . . . two or more final actuating mechanisms moving the same final output mechanism [of the final output mechanisms F16H 63/30]
63/285 . . . [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]
63/30 . . . Constructional features of the final output mechanisms
63/3003 . . . [Band brake actuating mechanisms]
Control of gearings conveying rotary motion

2063/3006 . . . . [moved by a non-mechanical force]
63/3009 . . . . [the final output mechanisms having elements remote from the gearbox]
63/3013 . . . . [the final output mechanism being characterised by linkages converting movement, e.g. into opposite direction by a pivoting lever linking two shift rods]
63/3016 . . . . [Final output mechanisms varying the leverage or force ratio]
63/302 . . . . [Final output mechanisms for reversing]
63/3023 . . . . [the final output mechanisms comprising elements moved by fluid pressure (band brake actuating mechanisms F16H 63/3003)]
63/3026 . . . . [comprising friction clutches or brakes (band brake actuating mechanisms F16H 63/3003)]
2063/303 . . . . [the friction member is actuated and released by applying pressure to different fluid chambers]
2063/3033 . . . . [the brake is actuated by springs and released by a fluid pressure]
2063/3036 . . . . [the clutch is actuated by springs and released by a fluid pressure]
63/304 . . . . [the final output mechanisms comprising elements moved by electrical or magnetic force (band brake actuating mechanisms F16H 63/3003)]
63/3043 . . . . [comprising friction clutches or brakes]
2063/3046 . . . . [using electromagnetic clutch for coupling gear wheel to shaft (friction clutches F16H 63/3043)]
2063/305 . . . . [using electromagnetic solenoids]
2063/3053 . . . . [using linear motors]
2063/3056 . . . . [using cam or crank gearing]
2063/3059 . . . . [using racks]
2063/3063 . . . . [using screw devices]
2063/3066 . . . . [using worm gears]
63/3069 . . . . [Interrelationship between two or more final output mechanisms (interlocking devices F16H 63/36)]
2063/3073 . . . . [final output mechanisms mounted on a single shaft]
2063/3076 . . . . [Selector shaft assembly, e.g. supporting, assembly or manufacturing of selector or shift shafts; Special details thereof]
2063/3079 . . . . [Shift rod assembly, e.g. supporting, assembly or manufacturing of shift rails or rods; Special details thereof]
2063/3083 . . . . [Shift finger arrangements, e.g. shape or attachment of shift fingers]
2063/3086 . . . . [Shift head arrangements, e.g. forms or arrangements of shift heads for preselection or shifting]
2063/3089 . . . . [Spring assisted shift, e.g. springs for accumulating energy of shift movement and release it when clutch teeth are aligned]
2063/3093 . . . . [Final output elements, i.e. the final elements to establish gear ratio, e.g. dog clutches or other means establishing coupling to shaft (fluid actuated clutches F16H 63/3026; electromagnetic clutches F16H 2063/3046)]
2063/3096 . . . . [Sliding keys as final output elements; Details thereof]
63/32 . . . . Gear shift yokes, [e.g. shift forks]
2063/321 . . . . [characterised by the interface between fork body and shift rod, e.g. fixing means, bushes, cams or pins]
2063/322 . . . . [characterised by catches or notches for moving the fork]
2063/324 . . . . [characterised by slide shoes, or similar means to transfer shift force to sleeve]
2063/325 . . . . [Rocker or swiveling forks, i.e. the forks are pivoted in the gear case when moving the sleeve]
2063/327 . . . . [essentially made of sheet metal]
2063/328 . . . . [essentially made of plastics, e.g. injection molded]
63/34 . . . . Locking or disabling mechanisms
63/3408 . . . . [the locking mechanism being moved by the final actuating mechanism]
63/3416 . . . . [Parking lock mechanisms or brakes in the transmission]
63/3425 . . . . [characterised by pawls or wheels]
63/3433 . . . . [Details of latch mechanisms, e.g. for keeping pawls out of engagement]
63/3441 . . . . [Parking locks engaging axially]
63/345 . . . . [using friction brakes, e.g. a band brakes]
63/3458 . . . . [with electric actuating means, e.g. shift by wire]
63/3466 . . . . [using electric motors]
63/3475 . . . . [using solenoids]
63/3483 . . . . [with hydraulic actuating means]
63/3491 . . . . [Emergency release or engagement of parking locks or brakes]
63/36 . . . . Interlocking devices
63/38 . . . . Detents {spring-loaded ball units for holding levers in a limited number of positions G05G 5/065}
63/40 . . . . comprising signals other than signals for actuating the final output mechanisms
63/42 . . . . Ratio indicator devices
2063/423 . . . . [Range indicators for automatic transmissions, e.g. showing selected range or mode]
2063/426 . . . . [with means for advising the driver for proper shift action, e.g. prompting the driver with allowable selection range of ratios]
63/44 . . . . Signals to the control unit of auxiliary gearing
63/46 . . . . Signals to a clutch outside the gearbox
63/48 . . . . Signals to a parking brake [or parking lock; Control of parking locks or brakes being part of the transmission]
63/483 . . . . [Circuits for controlling engagement of parking locks or brakes]
63/486 . . . . [Common control of parking locks or brakes in the transmission and other parking brakes, e.g. wheel brakes]
63/50 . . . . Signals to an engine or motor
63/502 . . . . [for smoothing gear shifts]
2063/504 . . . . [for bringing engine into special condition by transmission control, e.g. by changing torque converter characteristic to modify engine set point to higher engine speed for better acceleration performance]
2063/506 . . . . [for engine torque resume after shift transition, e.g. a resume adapted to the driving style]
2063/508 . . . . [for limiting transmission input torque, e.g. to prevent damage of transmission parts]
Transmissions for multiple ratios

- comprising a power take off shaft
- specially adapted for front-wheel-driven vehicles
- specially adapted for rear-wheel-driven vehicles
- specially adapted for four-wheel-driven vehicles
- specially adapted for electric vehicles
- comprising at least one creep low gear, e.g. additional gear for extra low speed or creeping
- characterised by the number of forward speeds
- the gear ratios comprising two forward speeds
- the gear ratios comprising three forward speeds
- the gear ratios comprising four forward speeds
- the gear ratios comprising five forward speeds
- the gear ratios comprising six forward speeds
- the gear ratios comprising seven forward speeds
- the gear ratios comprising eight forward speeds
- the gear ratios comprising nine forward speeds
- the gear ratios comprising ten forward speeds
- the gear ratios comprising eleven forward speeds
- the gear ratio comprising twelve or more forward speeds
- characterised by the number of reverse speeds
- the gear ratios comprising two reverse speeds
- the gear ratios comprising three reverse speeds
- the gear ratios comprising four reverse speeds
- the gear ratios comprising five reverse speeds
- the gear ratios comprising six reverse speeds
- the gear ratios comprising seven reverse speeds
- the gear ratios comprising eight reverse speeds
- the gear ratios comprising nine reverse speeds
- the gear ratio comprising twelve or more reverse speeds

Determining of new ratio

- Computing a new ratio
- Selecting a state of operation, e.g. depending on two wheel or four wheel drive mode
- Determining the range

Determining the way or trajectory to new ratio, e.g. by determining speed, torque or time parameters for shift transition

- Optimizing the way to the new ratio
- Determining a modus for shifting (selection of shift speed modus F16H 2059/0226)
- Determining timing parameters of shifting, e.g. start of shifting (for smoothing gear shift F16H 61/08)

Shifting

- Skipping gear shift (for smoothing gear shift F16H 2061/0444)
- Preparing coupling or engaging of future gear
- Timing of gear shifts (for smoothing gear shift F16H 61/08)
- for auxiliary gear shifts (for smoothing auxiliary gear shifts F16H 2061/085)
- Swap shifting (for smoothing gear shift F16H 2061/0451)
- Interruption of shift, e.g. if new shift is initiated during ongoing previous shift
- characterised by the way or trajectory to a new ratio, e.g. by performing shift according to a particular algorithm or function (determining the way or trajectory to a new ratio F16H 2202/00)
- Preparing the opening or release of the torque transmitting element
- Filling the dead volume of actuators (controlling filling of clutches or brake servos F16H 61/62)
- Shifting activities
- Changing the input torque to the transmission
- Removing torque from current gears
- Uncoupling of current gear
- Synchronising of new gear
- Coupling of new gear
- Applying torque to new gears
- Synchronizing engine speed to transmission input speed

Driving activities

- Driving off
- Preparing to drive off
- Holding or hillholding
- Creeping
- Rocking
- Switching between forward and reverse (rocking F16H 2312/08)
2312/10 . Inching
2312/12 . Parking
2312/14 . Going to, or coming from standby operation, e.g. for engine start-stop operation at traffic lights
2312/16 . Coming to a halt
2312/18 . Strong or emergency braking
2312/20 . Start-up or shut-down

2342/00 Calibrating
2342/02 . Calibrating shift or range movements
2342/04 . Calibrating engagement of friction elements
2342/042 . Point of engagement
2342/044 . Torque transmitting capability
2342/06 . Determining which part to calibrate or timing of calibrations
2342/10 . Calibrating valves

2700/00 Transmission housings and mounting of transmission components therein; Cooling; Lubrication; Flexible suspensions, e.g. floating frames
2700/02 . Transmissions, specially for working vehicles
2700/04 . Starting devices or devices to start turning of shafts
2700/06 . Protections for shifting mechanical transmissions

2702/00 Combinations of two or more transmissions
2702/02 . Mechanical transmissions with planetary gearing combined with one or more other mechanical transmissions
2702/04 . Combinations of a speed-change mechanism without planetary gearing with a differential for driving a vehicle drive axle
2702/06 . Combinations of transmissions with parallel force splitting paths having same output

2704/00 Control mechanisms and elements applying a mechanical movement
2704/02 . Speed-change devices wherein the control lever actuates directly sliding gears pivoting around two non-parallel axis
2704/04 . Speed-change devices with an intermediary mechanism placed between control member and actuator

2706/00 Rotary transmissions with mechanical energy accumulation and recovery without means for automatic selfregulation essentially based on spring action or inertia

2708/00 Control devices for speed-changing geared mechanisms, e.g. specially adapted couplings for synchronising devices, devices to simplify control, control of auxiliary gearboxes
2708/02 . only the toothed wheels remain engaged
2708/04 . only the toothed wheels remain engaged, the control being mechanical
2708/06 . only the toothed wheels may be disengaged, the control being hydraulic or pneumatic
2708/08 . only the toothed wheels may be disengaged, the control being electric
2708/10 . only the toothed wheels may be disengaged, the control being mechanical
2708/12 . only the toothed wheels may be disengaged, the control being hydraulic or pneumatic
2708/14 . only the toothed wheels may be disengaged, the control being hydraulic or pneumatic
2708/16 . wherein the gearing is not described or not essential
2708/18 . wherein the gearing is not described or not essential, the control being mechanical
2708/20 . wherein the gearing is not described or not essential, the control being hydraulic or pneumatic
2708/22 . wherein the gearing is not described or not essential, the control being electric

2708/24 . with a preselection system, mainly semi-automatic, e.g. with automatic preselection, but controlled at the intended moment, with force amplification
2708/26 . only the toothed wheels remain engaged
2708/28 . only the toothed wheels may be disengaged

2710/00 Control devices for speed-change mechanisms, the speed change control is dependent on function parameters of the gearing
2710/02 . Control dependent on speed and torque, wherein only the toothed wheels remain engaged, control being mechanical
2710/04 . Control dependent on speed
2710/06 . only the toothed wheels remain engaged
2710/08 . only the control being mechanical
2710/10 . only the control being hydraulic or pneumatic
2710/12 . only the control being electric
2710/14 . Control dependent on speed, wherein only the toothed wheels may be disengaged, control being mechanical
2710/16 . the gearing is not described or not essential
2710/18 . the control being mechanical
2710/20 . the control being hydraulic or pneumatic
2710/22 . the control being electric
2710/24 . Control dependent on torque
2710/26 . wherein only the toothed wheels remain engaged, the control being mechanical

2712/00 Mechanisms for changing direction
2712/02 . Automatic control, e.g. for an alternating movement
2712/04 . the control being hydraulic or pneumatic
2712/06 . only with toothed wheels or friction wheels
2712/08 . only the toothed wheels may be disengaged
2712/10 . with a combination of engaged and disengageable toothed wheels

2714/00 Different types speed-changing mechanisms for toothed gearing
2714/02 . only with toothed wheels remaining engaged
2714/04 . with specially adapted devices

2716/00 Control devices for speed-change mechanisms of planetary gearings, with toothed wheels remaining engaged, e.g. also for devices to simplify the control or for synchronising devices combined with control devices
2716/02 . the control being mechanical
2716/04 . the control being hydraulic or pneumatic
2716/06 . Circuits thereof
2716/08 . the control being electric
2716/10 . only the toothed wheels may be disengaged, the control being mechanical
2716/12 . with preselection system, mainly semi-automatic, e.g. with automatic preselection, but controlled at the intended moment, with force amplification
2716/14 . only with toothed wheels remaining engaged

2718/00 Mechanisms for speed-change of planetary gearing, the speed change control being dependent on function parameters of the gearing
2718/02 . Control dependent on speed and torque, wherein only the toothed wheels remain engaged
2718/04 . the control being mechanical
2718/06 . the control being hydraulic or pneumatic
2718/08 . Control dependent on speed
only the toothed wheels remain engaged
the control being mechanical
the control being hydraulic or pneumatic
the control being electric
Control dependent on torque
only the toothed wheels remain engaged
the control being mechanical
the control being hydraulic or pneumatic
the control being electric

Different types of speed-change gear mechanisms

Gears with a non-circular rolling curve or gears with special teeth
Combining a planetary speed-change gearing with a motor vehicle drive axle differential