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, or 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 propulsion
   B63H 25/00  Marine steering gears
   [B64C 27/12, B64C 27/58]  (Transmissions for helicopters)
   [B64D 35/00]  (Transmissions for aircraft)
   F01- F04  Machines, engines, pumps
   F15B 15/00  Gearings associated with fluid-actuated devices
   G01D 5/04  Gearings 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

| 1/00 | Toothed gearings for conveying rotary motion (specific for conveying rotary motion with variable gear ratio or for reversing rotary motion F16H 3/00) |
| 1/003 | [Monodirectionally torque-transmitting toothed gearing] |

1/006  .  [the driving and driven axes being designed to assume variable positions relative to one another during operation]
1/002  .  without gears having orbital motion
1/004  .  involving only two intermeshing members
1/006  .  .  with parallel axes
1/008  .  .  .  .  the members having helical, herringbone, or like teeth
Toothed gearings for conveying rotary motion

- one of the members being internally toothed
- with non-parallel axes
- comprising spiral gears
- comprising conical gears only
- with offset axes, e.g. hypoid gearings
- comprising worm and worm-wheel
- with balls between the co-operating parts
- the members having helical, herringbone, or like teeth (F16H 1/14 takes precedence)
- involving more than two intermeshing members
- with non-parallel axes (F16H 1/22 takes precedence)
- characterised by the driving or driven member being composed of two or more gear wheels
- with a plurality of driving or driven shafts; with arrangements for dividing torque between two or more intermediate shafts
- with non-parallel axes
- [two or more worm and worm-wheel gearings]
- comprising two or more gearwheels in mesh with the same internally toothed wheel
- involving gears essentially having intermeshing elements other than involute or cycloidal teeth (F16H 1/16 takes precedence)
- Special means compensating for misalignment of axes
- with gears having orbital motion
- [with means for equalising the distribution of load on the planet-wheels]
- by allowing limited movement of the ring gear relative to the casing or shaft
- by allowing limited movement of the planet carrier, e.g. relative to its shaft
- by allowing limited movement of the planets relative to the planet carrier or by using free floating planets
- by allowing limited movement of the sun gear
- involving conical gears
- Arrangements for adjusting or for taking-up backlash
- comprising three central gears, i.e. ring or sun gear, engaged by at least one common orbital gear mounted on an idling carrier
- comprising two or more coaxial and identical sets of orbital gears, e.g. for distributing torque between the coaxial sets
- in which an orbital gear has an axis crossing the main axes of the gearing and has helical teeth or is a worm
- in which the central axis of the gearing lies inside the periphery of an orbital gear
- the orbital gear being nutating
- comprising at least one universal joint, e.g. a Cardan joint
- comprising eccentric crankshafts driving or driven by a gearing
- comprising two axially spaced, rigidly interconnected, orbital gears
- comprising a carrier with pins guiding at least one orbital gear with circular holes
- comprising a carrier with linear guiding means guiding at least one orbital gear
- [with orbital gear sets comprising an internally toothed ring gear]
- involving gears essentially having intermeshing elements other than involute or cycloidal teeth (in worm gearing F16H 1/30)
- with two central gears coupled by intermeshing orbital gears
- Systems consisting of a plurality of gear trains each with orbital gears, [i.e. systems having three or more central gears]
- Special means compensating for misalignment of axes, e.g. for equalising distribution of load on the face width of the teeth (in combination with distribution of load on the planet-wheels F16H 1/2809)
- 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)
- convertible for varying the gear-ratio, e.g. for selecting one of several shafts as the input shaft
- using gears having teeth movable out of mesh (F16H 3/42 takes precedence)
- the gear-ratio being changed by inversion of torque direction
- for gearings using gears having orbital motion
- power being selectively transmitted by either one of the parallel flow paths
- with two flow paths, one being directly connected to the input, the other being connected to the input though a clutch
- comprising means for selectively driving countershafts
- without gears having orbital motion
- with internally-toothed gears
- with worm and worm-wheel or gears essentially having helical or herring-bone teeth
- exclusively or essentially with continuously meshing gears, that can be disengaged from their shafts

NOTE

In this group, gears which can be put out of mesh are not taken into consideration if they are used for reversal only.

- with countershafts coaxial with input or output shaft
- with gear ratios in which the power is transferred by axially coupling idle gears
- [using unsynchronised clutches]
- [using torque sharing, i.e. engaging two gear ratios simultaneously to transfer large torque, e.g. using one slipping clutch]
- comprising means for power-shifting

2001/323
2001/324
2001/325
2001/326
2001/327
2001/328
1/34
1/36
1/46
1/48
3/00
3/001
3/002
3/003
3/005
3/006
2003/007
2003/008
3/02
3/04
3/06
3/08
2003/0803
2003/0807
2003/0811
2003/0815
2003/0818
Toothed gearings for conveying rotary motion

[characterised by the arrangement of at least one reverse gear]

[wherein at least one gear on the input shaft, or on a countershaft is used for two different forward gear ratios]

3/083 . . . with radially acting and axially controlled clutching members, e.g. sliding keys { (clutches with clutching members movable otherwise than only axially F16D 11/12; clutches with wedgeable clutching members F16D 15/00; systems of mechanically actuated clutches F16D 21/04) }

3/085 . . . with more than one output shaft

3/087 . . . characterised by the disposition of the gears (F16H 3/083, F16H 3/085 take precedence)

NOTE

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

3/089 . . . all of the meshing gears being supported by a pair of parallel shafts, one being the input shaft and the other the output shaft, there being no countershaft involved

3/091 . . . including a single countershaft

3/0915 . . . . { with coaxial input and output shafts }

3/093 . . . . with two or more countershafts

2003/0931 . . . . { (each countershaft having an output gear meshing with a single common gear on the output shaft) }

2003/0933 . . . . { (with coaxial countershafts) }

2003/0935 . . . . { (with multiple countershafts comprising only one idle gear and one gear fixed to the countershaft) }

2003/0936 . . . . { (with multiple countershafts comprising only two idle gears and one gear fixed to the countershaft) }

2003/0938 . . . . { (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

2003/123 . . . . . { [using a brake] }

3/126 . . . . . { (using an electric drive) }

3/14 . . . . . 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

NOTE

In this group, gears which can be put out of mesh are not taken into consideration if they are used for reversal only.

3/18 . . . Gearings for reversal only

3/20 . . . exclusively or essentially using gears that can be moved out of gear

NOTE

In this group, gears which can be put out of mesh are not taken into consideration if they are used for reversal only.

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 . . . . . 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)]

2003/442 . . . . . { [comprising two or more sets of orbital gears arranged in a single plane] }

2003/445 . . . . . { [without permanent connection between the input and the set of orbital gears] }

2003/447 . . . . . { [without permanent connection between the set of orbital gears and the output] }

3/46 . . . . . Gearings 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 . . . . . Gearings for reversal only

3/62 . . . . . Gearings 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
Toothed gearings for conveying rotary motion

Gearing for conveying rotary motion by endless flexible members

7/00 Gearings for conveying rotary motion by endless flexible members (specific for conveying rotary motion with variable gear ratio or for reversing rotary motion F16H 9/000 ; chainwheels F16H 55/52)

7/02 with belts; with V-belts
7/023 with belts having a toothed contact surface or regularly spaced bosses or hollows for slipless or nearly slipless meshing with complementary profiling contact surface of a pulley (toothed belts F16G 1/28; F16G 5/20)

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)

7/04 with ropes
7/06 with chains

7/087/0826 . . . . [Actuators for final output members]
2007/0802 . . . . [Leaf springs]
2007/0804 . . . . [Compression coil springs]
2007/0806 . . . . [Extension coil springs]
2007/0808 . . . . [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]
2007/0827 . . . . [for disconnecting the drive]
2007/0829 . . . . [with vibration damping means]
2007/0831 . . . . [of the dry friction type]
2007/0834 . . . . [of the viscous friction type, e.g. viscous fluid]
2007/0836 . . . . [of the fluid and restriction type, e.g. dashpot]
2007/0838 . . . . [of the dissipating material type, e.g. elastomeric spring]
2007/0840 . . . . [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]
2007/0848 . . . . [with means for impeding reverse motion]
2007/0851 . . . . [Wedges]
2007/0853 . . . . [Ratchets]
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]
2007/0864 . . . . [Pulleys]
2007/0868 . . . . [comprising means for changing working diameter of pulley]
2007/0867 . . . . [Sprockets]
2007/0872 . . . . [Sliding members]
2007/0874 . . . . [Two or more finally actuated members]
2007/0876 . . . . [Control or adjustment of actuators]
2007/0878 . . . . [Disabling during transport]
2007/0888 . . . . [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]
Gearing for conveying rotary motion by endless flexible members

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)
7/1281 . . . . . (where the axis of the pulley moves along a substantially circular path)
7/129 . . . . . (with means for impeding reverse motion)
7/14 . . . . . of a driving or driven pulley
7/16 . . . . . without adjusting the driving or driven shaft
7/18 . . Means of guiding or supporting belts, ropes, or chains (construction of pulleys F16H 55/36)
2007/185 . . . . . (the guiding surface in contact with the belt, rope or chain having particular shapes, structures or materials)
7/20 . . . . Mountings for rollers or pulleys
7/22 . . . . Belt, rope, or chain shifters
7/24 . . . . Equipment for mounting belts, ropes, or chains
9/00 Gearings for conveying rotary motion with variable gear ratio, or for reversing rotary motion, by endless flexible members (control of change-speed or reversing-gearings conveying rotary motion 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
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 with constant gear ratio by friction between rotary members (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 (gearing 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
Other friction gearing for conveying rotary motion

15/34 . . . . . with convex friction surface
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-operative 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 31/60)
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]
2019/008 . . . . . [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
Other friction gearing for conveying rotary motion

F16H

Gearing for conveying or converting motion by means of levers, links, cams or screw-and-nut mechanisms

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
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
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-rod to each crank or eccentric
21/36 . . . . . . without swinging connecting-rod, e.g. with epicyclic parallel motion, slot-and-crack 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-crank gearings

[(conveying rotary motion with toothed nutating gears F16H 13/221)]

23/02 . . . with adjustment of throw by changing the position of the wobble-member (gearings in which the transmission ratio is changed by adjustment of a wobble-plate F16H 29/04; gearings with gyroscopic action, e.g. comprising wobble-plates F16H 33/10)
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
25/12 . . . with reciprocation along the axis of rotation, e.g. gearings with helical grooves and automatic reversal [or cams]
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 (crank or eccentric gearings without swinging connecting-rod F16H 21/36)
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)

25/2003 . . . . . . . . [with arrangements for taking up backlash (F16H 25/2209 takes precedence)]
25/2006 . . . . . . . . [with more than one nut or with nuts consisting of more than one bearing part]

25/2009 . . . . . . . [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)]

25/2028 . . . . . . . [using screw profiles with high efficiency for converting reciprocating motion into oscillating movement]
25/2031 . . . . . . . [Actuator casings]
Gearing for conveying or converting motion by means of levers, links, cams or screw-and-nut mechanisms

2025/2034 . . . . . . [Extruded frame casings]
2025/2037 . . . . . . [Actuator supports or means for fixing piston end, e.g. flanges]
2025/204 . . . . . . [Axial sliding means, i.e. for rotary support and axial guiding of nut or screw shaft]
2025/2043 . . . . . . [Screw mechanisms driving an oscillating lever, e.g. lever with perpendicular pivoting axis]
2025/2046 . . . . . . [with gears arranged perpendicular to screw shaft axis, e.g. helical gears engaging tangentially the screw shaft]
25/205 . . . . . . [comprising alternate power paths, e.g. for fail safe back-up]
2025/2053 . . . . . . [Screws in parallel arrangement driven simultaneously with an output member moved by the screws]
25/2056 . . . . . . [Telescopic screws with at least three screw members in coaxial arrangement]
2025/2059 . . . . . . [Arrangements for driving the actuator]
2025/2065 . . . . . . [Manual back-up means for overriding motor control, e.g. hand operation in case of failure]
2025/2068 . . . . . . [Means for returning linear actuator to zero position, e.g. upon occurrence of failure by using a spring]
2025/2071 . . . . . . [Disconnecting drive source from the actuator, e.g. using clutches for release of drive connection during manual control]
2025/2075 . . . . . . [Coaxial drive motors]
2025/2078 . . . . . . [the rotor being integrated with the nut or screw body]
2025/2081 . . . . . . [Parallel arrangement of drive motor to screw axis]
2025/2084 . . . . . . [Perpendicular arrangement of drive motor to screw axis]
2025/2087 . . . . . . [using planetary gears]
2025/209 . . . . . . [using worm gears]
2025/2093 . . . . . . [using conical gears]
2025/2096 . . . . . . [using endless flexible members]
25/22 . . . . . . [with balls, rollers, or similar members between the co-operating parts; Elements essential to the use of such members]
25/2204 . . . . . . [with balls]
25/2209 . . . . . . [with arrangements for taking up backlash]
25/2214 . . . . . . [with elements for guiding the circulating balls]
25/2219 . . . . . . [Axially mounted end-deflectors]
25/2223 . . . . . . [Cross over deflectors between adjacent thread turns, e.g. S-form deflectors connecting neighbouring threads]
25/2228 . . . . . . [the device for circulation forming a part of the screw member]
25/2233 . . . . . . [with cages or means to hold the balls in position]
25/2238 . . . . . . [using ball spacers, i.e. spacers separating the balls, e.g. by forming a chain supporting the balls]
2025/2242 . . . . . . [Thread profile of the screw or nut showing a pointed "gothic" arch in cross-section]
25/2247 . . . . . . [with rollers]
25/2252 . . . . . . [Planetary rollers between nut and screw]
2025/2257 . . . . . . [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)]
2025/2271 . . . . . . [with means for guiding circulating rollers]
2025/2276 . . . . . . [using roller spacers, i.e. spacers separating the rollers, e.g. by forming a complete chain]
2025/228 . . . . . . [Screw mechanisms having rollers being supported by the screw shaft and engaging the nut]
25/2285 . . . . . . [with rings engaging the screw shaft with the inner perimeter, e.g. using inner rings of a ball bearing]
25/229 . . . . . . [Eccentric rings with their axis arranged substantially parallel to the screw shaft axis]
25/2295 . . . . . . [Rings which are inclined or can pivot around an axis perpendicular to the screw shaft axis]
25/24 . . . . . . [Elements essential to such mechanisms, e.g. screws, nuts (F16H 25/22 takes precedence)]
25/2409 . . . . . . [one of the threads being replaced by elements specially formed for engaging the screw or nut, e.g. pins, racks, toothed belts]
25/2418 . . . . . . [Screw seals, wipers, scrapers or the like]
25/2427 . . . . . . [one of the threads being replaced by a wire or stripmetal, e.g. spring]
2025/2436 . . . . . . [Intermediate screw supports for reducing unsupported length of screw shaft]
2025/2445 . . . . . . [Supports or other means for compensating misalignment or offset between screw and nut]
25/2454 . . . . . . [Brakes; Rotational locks]
2025/2463 . . . . . . [using a wrap spring brake, i.e. a helical wind up spring for braking or locking]
25/2472 . . . . . . [Safety nuts]
2025/2481 . . . . . . [Special features for facilitating the manufacturing of spindles, nuts, or sleeves of screw devices]
2025/249 . . . . . . [Special materials or coatings for screws or nuts (lubrication F16H 57/0497)]

Gears with intermittently-driving members

27/00 . . . . . . Step-by-step mechanisms without freewheel members, e.g. Geneva drives
27/02 . . . . . . with at least one reciprocating or oscillating transmission member { (F16H 27/04 takes precedence) }
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 ([gearings for converting oscillating or reciprocating movement with freewheeling members or other intermittently-driving members into a rotary movement F16H 31/00])

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 a cam, on one of the shafts 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 acting 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)

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 paws driven by a rotary cam)
31/005 .. (with paws driven by a reciprocating or oscillating transmission member (F16H 31/002, 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
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 .. with 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 25/245)]
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
35/06 .. Gearings designed to allow relative movement between supports thereof without ill effects (special means compensating for misalignment of axes F16H 1/26, F16H 1/48 ; mounting or supporting gearboxes F16H 57/025)
35/10 .. Arrangements or devices for absorbing overload or preventing damage by overload {(for screw mechanisms F16H 25/2021)}
2035/103 .. (with drive interruption by structural failure of overload preventing means, e.g. using shear pins)
2035/106 .. [Monitoring of overload]
35/12 .. Transmitting mechanisms with delayed effect
35/14 .. Mechanisms with only two stable positions, e.g. acting at definite angular positions
35/16 .. Mechanisms for movements or movement relations conforming to mathematical formulae
35/18 .. Turning devices for rotatable members, e.g. shafts
Gearings with intermittently-driving member

37/00 Combinations of mechanical gearings, not provided for in groups F16H 1/00 - F16H 35/00
(combinations of mechanical gearing with fluid clutches or fluid gearing F16H 47/000)

37/02 . . . . . . . (toothed gearing combined with continuous variable friction gearing)

37/021 . . . . [the toothed gearing having orbital motion]

2037/023 . . . . [CVT's provided with at least two forward and one reverse ratio in a serial arranged sub-transmission]

2037/025 . . . . [CVT's in which the ratio coverage is used more than once to produce the overall transmission ratio coverage, e.g. by shift to end of range, then change ratio in sub-transmission and shift CVT through range once again]

2037/026 . . . . [CVT layouts with particular features of reversing gear, e.g. to achieve compact arrangement]

37/027 . . . . [toothed gearing combined with a gear using endless flexible members for reversing rotary motion only]

2037/028 . . . . [having two distinct forward drive ratios and one reverse drive ratio arranged in series with a continuously variable transmission unit]

37/04 . . . . . . . Combinations of toothed gearings only
(F16H 37/06 takes precedence)

37/041 . . . . [for conveying rotary motion with constant gear ratio]

**WARNING**

This group is not complete pending a reorganisation; see also subgroups of F16H 1/00

37/042 . . . . [change gear transmissions in group arrangement]

37/043 . . . . . . . [without gears having orbital motion]

2037/044 . . . . . . . [comprising a separate gearing unit for shifting between forward or reverse]

2037/045 . . . . . . . [comprising a separate gearing unit for shifting between high and low ratio range]

37/046 . . . . . . . [with an additional planetary gear train, e.g. creep gear, overdrive]

2037/047 . . . . . . . [comprising one or more orbital gear sets coaxial with a first shaft and having more than one drive connection to a second shaft parallel to the first shaft]

2037/048 . . . . . . . [Combinations of parallel shaft and orbital motion gearing, wherein the orbital motion gear has more than one connection with the parallel shaft gearing]

37/049 . . . . . . . [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 37/2 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]

2037/0866 . . . . [Power split variators with distributing differentials, with the output of the CVT connected or connectable to the output shaft]

2037/0873 . . . . . . . [with switching, e.g. to change ranges]

2037/088 . . . . . . . [Power split variators with summing differentials, with the input of the CVT connected or connectable to the input shaft]

2037/0886 . . . . . . . [with switching means, e.g. to change ranges]

2037/0893 . . . . . . . [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)

2037/101 . . . . [Power split variators with one differential at each end of the CVT]

2037/102 . . . . [the input or output shaft of the transmission is connected or connectable to two or more differentials]

2037/103 . . . . [Power split variators with each end of the CVT connected or connectable to a Ravigneaux set]

2037/104 . . . . [Power split variators with one end of the CVT connected or connectable to two or more differentials]

2037/105 . . . . [characterised by number of modes or ranges, e.g. for compound gearing]

2037/106 . . . . [with switching means to provide two variator modes or ranges]

2037/107 . . . . [with switching means to provide three variator modes or ranges]

2037/108 . . . . [with switching means to provide four or more variator modes or ranges]

37/12 . . . . . . . Gearings comprising primarily toothed or friction gearings, links or levers, and cams, or members of at least two of these types (gearings with cranks, eccentrics, or like members fixed to one rotary member and guided along tracks on the other F16H 21/14; crank or eccentric gearings with cams or additional guides, or with members having rolling contact F16H 21/28, F16H 21/30)
Gearings with intermittently-driving member

37/122 . . . (for interconverting rotary motion and oscillating motion)
37/124 . . . (for interconverting rotary motion and reciprocating motion)
37/126 . . . (Guiding mechanism using levers combined with gearings for straight line output movement, e.g. by using gears or pulleys with ratio 2:1)
2037/128 . . . (Generating reciprocating motion by a planetary gear (ratio 2:1) using endless flexible members)
37/14 . . . the movements of two or more independently-moving members being combined into a single movement (screw mechanisms with both nut and screw being driven F16H 25/2018)
37/16 . . . with a driving or driven member which both rotates or oscillates on its axis and reciprocates

Fluid gearing

39/00 Rotary fluid gearing using pumps and motors of the volumetric type, i.e. passing a predetermined volume of fluid per revolution (control of exclusively fluid gearing F16H 61/38)

39/005 . . . (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
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 interconnected 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

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

45/00 Combinations of fluid gearings for conveying rotary motion with couplings or clutches (gearing systems consisting of a plurality of hydrokinetic units operating alternatively F16H 41/22, F16H 47/085)

NOTE

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

2045/002 . . . [comprising a clutch between prime mover and fluid gearing]
2045/005 . . . [comprising a clutch between fluid gearing and the mechanical gearing unit]
2045/007 . . . [comprising a damper between turbine of the fluid gearing and the mechanical gearing unit]
45/02 . . . with mechanical clutches for bridging a fluid gearing of the hydrokinetic type (control of torque converter lock-up clutches F16H 61/14)
2045/0205 . . . . . . (two chamber system, i.e. without a separated, closed chamber specially adapted for actuating a lock-up clutch)
2045/021 . . . . . . (three chamber system, i.e. comprising a separated, closed chamber specially adapted for actuating a lock-up clutch)
2045/0215 . . . . . (Details of oil circulation)
2045/0221 . . . . . [with damping means]
2045/0226 . . . . . [comprising two or more vibration dampers]
2045/0231 . . . . . [arranged in series]
2045/0236 . . . . . [with axial dampers, e.g. comprising a ramp system]
Fluid gearing

Fluid gearing

2045/0242 . . . . [with viscous dampers]
2045/0247 . . . . [having a turbine with hydrodynamic damping means]
2045/0252 . . . . [having a damper arranged on input side of the lock-up clutch]
2045/0257 . . . . [having a pump adapted for use as a secondary mass of the damping system]
2045/0263 . . . . [the damper comprising a pendulum]
2045/0268 . . . . [the damper comprising a gearing]
2045/0273 . . . . [characterised by the type of the friction surface of the lock-up clutch]
2045/0278 . . . . [comprising only two co-acting friction surfaces]
2045/0284 . . . . [Multiple disk type lock-up clutch]
2045/0289 . . . . [Details of friction surfaces of the lock-up clutch]
2045/0294 . . . . [Single disk type lock-up clutch, i.e. using a single disc engaged between friction members]

47/00 Combinations of mechanical gearing with fluid clutches or fluid gearing

47/02 . . . . the fluid gearing being of the volumetric type
2047/025 . . . . [the fluid gearing comprising a plurality of pumps or motors]
47/04 . . . . the mechanical gearing being of the type with members having orbital motion
2047/045 . . . . [the fluid gearing comprising a plurality of pumps or motors]
47/06 . . . . the fluid gearing being of the hydrokinetic type
47/065 . . . . [the mechanical gearing being of the friction or endless flexible member type]
47/07 . . . . using two or more power-transmitting fluid circuits ([F16H 47/065, F16H 47/10 take precedence]
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 . . . . with cams
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
2048/265 . . . . [with a fluid throttling means]
48/27 . . . . using internally-actuatable fluid pressure, e.g. internal pump types
48/28 . . . . using self-locking gears or self-braking gears
2048/282 . . . . [using the axial movement of axially movable bevel gears]
48/285 . . . . with self-braking intermeshing gears having parallel axes and having worms or helical teeth
48/29 . . . . with self-braking intermeshing gears having perpendicular arranged axes and having worms or helical teeth
48/295 . . . . using multiple means for force boosting
48/30 . . . . using externally-actuatable means
2048/305 . . . . [using manual actuators]
48/32 . . . . using fluid pressure actuators
48/34 . . . . using electromagnetic or electric actuators
2048/343 . . . . [using a rotary motor]
2048/346 . . . . [using a linear motor]
48/36 . . . . characterised by intentionally generating speed difference between outputs
2048/362 . . . . [using a continuously variable transmission]
2048/364 . . . . [using electric or hydraulic motors]
2048/366 . . . . [using additional non-orbital gears in combination with clutches or brakes]
2048/368 . . . . [using additional orbital gears in combination with clutches or brakes]
48/38 . . . . Constructional details (the outer casing comprising the differential and supporting input and output shafts F16H 57/037)
2048/382 . . . . [Methods for manufacturing differential gearings]
2048/385 . . . . [of the ring or crown gear]
2048/387 . . . . [Shields or washers]
48/40 . . . . characterised by features of the rotating cases
Fluid gearing

Details of gearing or mechanisms

51/00  Levers of gearing mechanisms
51/02  . adjustable

53/00  Cams [: Non-rotary cams:] or cam-followers, e.g. rollers for gearing mechanisms
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 or sheaves for gearing mechanisms (of screw-and-nut gearing F16H 25/00)
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 57/041; producing gear wheels from plastics or substances in a plastic state B29D 15/00; heat treatment C21D 9/32; electrolytic surface treatment 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. elliptic gear]
55/0846  . . . [Intersecting-shaft arrangement of the toothed members (F16H 55/0813, F16H 55/0826, 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]

55/10  . Constructively simple tooth shapes, e.g. shaped as pins, as balls (gearwork for clocks and watches G04B 13/00)
55/12  . with body or rim assembled out of detachable parts
55/14  . Construction providing resilience or vibration-damping (F16H 55/06 takes precedence)
55/16  . . relating to teeth only
55/17  . . Toothed wheels (worm wheels F16H 55/22; chain wheels F16H 55/30)
55/171  . . . [Toothed belt pulleys]
2055/173  . . . [Crown gears, i.e. gears have axially arranged teeth]
2055/175  . . . [specially adapted for easy repair, e.g. exchange of worn teeth]
2055/176  . . . [Ring gears with inner teeth]
2055/178  . . . [combined with clutch means, e.g. gear with integrated synchronizer clutch]
55/18  . . Special devices for taking up backlash (for gears having orbital motion F16H 1/2863)
2055/185  . . . . [using compound gears with coincident teeth of different material, e.g. laminated construction of metal and elastomer gear layers, where elastic layer is slightly oversized]
55/20  . . . for bevel gears
55/22  . . . for transmissions with crossing shafts, especially worms, worm-gears
55/24  . . . Special devices for taking up backlash
55/26  . . . Racks
55/28  . . . Special devices for taking up backlash
2055/281  . . . . [Cylindrical or half-cylindrical bushings around the rack, e.g. using special wedges to reduce play]
55/283  . . . [using pressure yokes]
55/285  . . . . [with rollers or balls to reduce friction]
55/286  . . . . [with asymmetric layout of the yoke]
55/288  . . . . [comprising two or more pressure yokes]
55/30  . . Chain-wheels
55/303  . . . . [for round linked chains, i.e. hoisting chains with identical links]
2055/306  . . . . [with means providing resilience or vibration damping in chain sprocket wheels]
55/32  . . Friction members
Details of gearing or mechanisms

F16H

2055/325 . . . [characterized by roughness or hardness of friction surface]

55/34 . . . Non-adjustable friction discs

55/36 . . . Pulleys (with features essential for adjustment 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

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 7/00)

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 25/00; 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 2055/175)]

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 2057/018)]

2057/0087 . . . [Computer aided design [CAD] specially adapted for gearing features (computer aided design per se G06F 30/00); Analysis of gear systems]

2057/0093 . . . [Means or measures for transport, shipping or packaging]

57/01 . . . Monitoring wear or stress of gearing elements, e.g. for triggering maintenance

2057/012 . . . . . [of gearings]

2057/014 . . . . . [of friction elements in transmissions]

2057/016 . . . . . [Monitoring of overload conditions]

2057/018 . . . . . [Detection of mechanical transmission failures (fixing or adapting to failure F16H 2057/0081; of transmission control F16H 61/121)]

57/02 . . . Gearboxes; Mounting gearing therein

NOTE

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

57/02004 . . . [the gears being positioned relative to one another by rolling members or by specially adapted surfaces on the gears, e.g. by a rolling surface with the diameter of the pitch circle]

2057/02008 . . . [characterised by specific dividing lines or planes of the gear case]

2057/02013 . . . [Extension units for gearboxes, e.g. additional units attached to a main gear]

2057/02017 . . . [characterised by special features related to the manufacturing of the gear case, e.g. special adaptations for casting]

2057/02021 . . . [with means for adjusting alignment]

2057/02026 . . . [Connection of auxiliaries with a gear case; Mounting of auxiliaries on the gearbox]

2057/0203 . . . . . [the gearbox is associated or combined with a crank case of an engine]

2057/02034 . . . . . [Gearboxes combined or connected with electric machines (structural association with electric machines H02K 7/116)]

2057/02039 . . . . . [Gearboxes for particular applications]

2057/02043 . . . . . [for vehicle transmissions]

2057/02047 . . . . . . [Automatic transmissions]

2057/02052 . . . . . . [Axle units; Transfer casings for four wheel drive]

2057/02056 . . . . . . [for utility vehicles, e.g. tractors or agricultural machines]

2057/0206 . . . . . . . [for commercial vehicles, e.g. buses or trucks]

2057/02065 . . . . . . . [for motorcycles or squads]

2057/02069 . . . . . . . [for industrial applications]

2057/02073 . . . . . . . . . [Reduction gearboxes for industry]

2057/02078 . . . . . . . . . [for wind turbines]

2057/02082 . . . . . . . . . [for application in vehicles other than propelling, e.g. adjustment of parts]

2057/02086 . . . . . . . . . [Measures for reducing size of gearbox, e.g. for creating a more compact transmission casing]
57/02091 . . . [Measures for reducing weight of gearbox (by using particular materials F16H 57/032)]
57/02095 . . . [Measures for reducing number of parts or components]

57/021 . . . [Shaft support structures, e.g. partition walls, bearing eyes, casing walls or covers with bearings]
57/0213 . . . [Support of worm gear shafts]
57/0216 . . . [Intermediate shaft supports, e.g. by using a partition wall]

57/022 . . . [Adjustment of gear shafts or bearings (for compensating misalignment of axes of toothed gearings without orbital motion F16H 1/26; for compensating misalignment of axes of planetary gears F16H 1/48)]

57/0221 . . . [Axial adjustment]
57/0222 . . . [Lateral adjustment]
57/0224 . . . [using eccentric bushes]
57/0225 . . . [with means for adjusting alignment]
57/0227 . . . [Assembly method measuring first tolerances or position and selecting mating parts accordingly, e.g. special sized shims for transmission bearings]

57/0228 . . . [Mounting with rough tolerances and fine adjustment after assembly]
57/023 . . . [Mounting or installation of gears or shafts in the gearboxes, e.g. methods or means for assembly]
57/0235 . . . [specially adapted to allow easy accessibility and repair (using repair kits F16H 2057/0068)]
57/025 . . . [Support of gearboxes, e.g. torque arms, or attachment to other devices]

57/027 . . . [characterised by 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 gearboxes, 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]
57/0325 . . . [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]

57/0335 . . . [Series transmissions of modular design, e.g. providing for different transmission ratios or power ranges]

57/035 . . . [Gearboxes for gearing 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 41/50; 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 felts]
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]
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 57/0468)]
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]
Details of gearing or mechanisms

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 bearing or to a reservoir (means for sealing gearboxes F16H 57/0299)}
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 57/0272)}
57/0459 . . . . {Oil-mist or spray lubrication}
57/046 . . . . {Means to reduce foam formation}
57/0461 . . . . {Grease lubrication; Drop-feed lubrication}
57/0463 . . . . {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}
57/0471 . . . . {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 . . . . {Synchronesh devices}
57/0479 . . . . {Gears or bearings on planet carriers}
57/048 . . . . {Type of gearings to be lubricated, cooled or heated}
57/0482 . . . . {Gears 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
57/08 . . . . of gearings with members having orbital motion
57/082 . . . . {Planet carriers}
2057/085 . . . . {Bearings for orbital gears}
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 63/3026)}
57/10 . . . . Braking arrangements
57/12 . . . . Arrangements for adjusting or for taking-up backlash not provided for elsewhere
2057/121 . . . . {using parallel torque paths and means to twist the two path against each other}
2057/122 . . . . {by using two independent drive sources, e.g. electric motors}
2057/123 . . . . {using electric control means}
2057/125 . . . . {Adjustment of backlash during mounting or assembly of gearing}
2057/126 . . . . {Self-adjusting during operation, e.g. by a spring}
2057/127 . . . . {using springs}
2057/128 . . . . {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 includes the final output element; 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;
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 61/66 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]

59/006 . . . [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

59/01 (for automatic transmissions with means for range selection and manual shifting, e.g. range selector with tiptronic)

59/0213 . . . (for selecting between different modes with range selector F16H 2059/082; for conjoint control B60W 60/182)

59/0226 . . . (for selecting particular shift speeds, e.g. a fast shift speed with aggressive gear change)

59/023 . . . (Selectors for gearings using voice control (for vehicle control B60R 60/1373))

59/0234 . . . (Selectors for gearings using foot control)

59/0239 . . . (Up- and down-shift or range or mode selection by repeated movement (mechanical step by step selection devices F16H 63/14))

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

59/0247 . . . (with lever or paddle behind steering wheel)

59/0252 . . . (with means for initiating skip or double gear shifts, e.g. by moving selection lever beyond a threshold)

59/0256 . . . (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)

2059/0278 . . . (Constructional 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)

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 . . . (comprising of electrical switches or sensors (range selectors with electric switches or sensors F16H 59/105))

59/045 . . . (consisting of fluid valves)

59/047 . . . (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))

59/048 . . . (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

59/065 . . . (Inching pedals for setting the ratio of an hydrostatic transmission)

59/08 . . . Range selector apparatus

59/081 . . . (using knobs or discs for rotary range selection)

59/089 . . . (with different modes)

59/083 . . . (Overdrive or overdrive cut-off)

59/084 . . . (Economy mode)

59/085 . . . (Power mode)

59/086 . . . (Adaptive mode, e.g. learning from the driver)

59/087 . . . (Winter mode, e.g. to start on snow or slippery surfaces)

59/088 . . . (Fast forward-reverse-sequence mode)

59/10 . . . (comprising levers)

59/105 . . . (comprising 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)

59/142 . . . (of driving resistance calculated from weight, slope, or the like)
Control of gearings conveying rotary motion

.... [characterised by change between positive and negative drive line torque, e.g. torque changes when switching between coasting and acceleration]

2059/144  59/62  . . Atmospheric pressure
2059/145  59/64  . . Atmospheric temperature
2059/147  59/66  . . Road conditions, e.g. slope, slippery
2059/148  2059/663  . . [Road slope]
2059/149  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

59/16  2059/6807  . . [Status of gear-change operation, e.g. clutch fully engaged]
59/18  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]

59/183  2059/6823  . . [Sensing neutral state of the transmission]
59/186  2059/683  . . [Sensing neutral state of the transmission]
59/20  2059/6838  . . [Sensing neutral state of the transmission]
59/22  2059/6846  . . [the flow in hydrostatic transmissions circuits, e.g. high, low or differential pressures]
59/24  2059/6853  . . [the state of the transmission units, i.e. motor or pump capacity, e.g. for controlled shifting of range gear]
59/26  2059/6861  . . [the pressures, e.g. high, low or differential pressures]
59/28  2059/6869  . . [the pump speed]
59/30  2059/6876  . . [the motor speed]
59/32  2059/6884  . . [Sensing or calculating the pump torque]
59/34  2059/6892  . . [Sensing or calculating the motor torque]
59/36  59/70  . . dependent on the ratio established
59/42  2059/702  . . [Rate of change of gear ratio, e.g. for triggering clutch engagement]
59/44  2059/704  . . [Monitoring gear ratio in CVT's]
59/46  2059/706  . . [Monitoring gear ratio in stepped transmissions, e.g. by calculating the ratio from input and output speed]
59/48  2059/708  . . [Sensing reverse gear, e.g. by a reverse gear switch]
59/49  59/71  . . dependent on oil characteristics, e.g. temperature, viscosity
59/50  2059/725  . . [Sensing or calculating temperature of friction devices, e.g. clutches to prevent overheating of friction linings]
59/52  59/74  . . Inputs being a function of engine parameters (F16H 59/14 takes precedence)
59/54  2059/743  . . [using engine performance or power for control of gearing (transmission input torque F16H 2059/147)]
59/56  2059/746  . . [Engine running state, e.g. on-off of ignition switch]
59/58  59/76  . . Number of cylinders operating
59/60  59/78  . . Temperature
59/62  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]
59/64  61/0000  . . [Control of exclusively fluid gearing, friction gearing, gearings with endless flexible members or other particular types of gearing]
Control of gearings conveying rotary motion

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 hydrostatic transmissions F16H 61/4174; deaeration or removal of unsolved gas F15B 21/044))
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 mathematic 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)]
2061/0209 . . . [with independent solenoid valves modulating the pressure individually for each clutch or brake]
2061/0211 . . . . [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]
Control of gearings conveying rotary motion

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 61/20)]

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, elements]

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]

61/0288 . . . . [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]

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]}
Control of gearings conveying rotary motion

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 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)

61/145 . . . (for controlling slip, e.g. approaching target slip value)

61/146 . . . (for smoothing gear shift shock)

61/147 . . . (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)

61/22 . . . Locking of the control input devices (constructional features of locking or disabling mechanisms F16H 63/34)

2061/223 . . . (Electrical gear shift lock, e.g. locking of lever in park or neutral position by electric means if brake is not applied; Key interlock, i.e. locking the key if lever is not in park position)

2061/226 . . . (Manual distress release of the locking means for shift levers, e.g. to allow towing of vehicle in case of breakdown (for parking locks F16H 63/3491))

61/24 . . . Providing feel, e.g. to enable selection

2061/241 . . . (Actuators providing feel or simulating a shift gate, i.e. with active force generation for providing counter forces for feed back)

2061/242 . . . (Mechanical shift gates or similar guiding means during selection and shifting)

2061/243 . . . (Cams or detent arrays for guiding and providing feel)

2061/245 . . . (Ramp contours for generating force threshold, e.g. cams or pushers for generating additional resistance for a reverse path)

2061/246 . . . (Additional mass or weight on shift linkage for improving feel)

2061/247 . . . (Detents for range selectors)

2061/248 . . . (with audible signals for providing selection or shift feed back)

61/26 . . . Generation or transmission of movements for final actuating mechanisms

NOTES
1. The generation or transmission of movements comprising only the selector apparatus, is classified in group 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
Control of gearings conveying rotary motion

F16H

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 \( F16H \ 61/213 \) ]

61/2815 . . . . . . . [with a control using only relays and switches]

2061/2823 . . . . . . . [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]

2061/283 . . . . . . . [Adjustment or calibration of actuator positions, e.g. neutral position]

2061/2838 . . . . . . . [Arrangements with single drive motor for selecting and shifting movements, i.e. one motor used for generating both movements]

2061/2846 . . . . . . . [Arrangements of actuators for enabling jump shifting for skipping of gear ratios]

2061/2853 . . . . . . . [Electromagnetic solenoids]

2061/2861 . . . . . . . [Linear motors]

2061/2869 . . . . . . . [Cam or crank gearing]

2061/2876 . . . . . . . [Racks]

2061/2884 . . . . . . . [Screw-nut devices]

2061/2892 . . . . . . . [other gears, e.g. worm gears, for transmitting rotary motion to the output mechanism]

61/30 . . . . . . . Hydraulic (or pnuematic) 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]

61/32 . . . . . . . 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

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

61/4069 . . . . . . . Valves related to the control of neutral, e.g. shut off valves

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 over-speeding when motor acts as a pump

61/4165 . . . . . . . Control of cooling or lubricating

61/4174 . . . . . . . Control of venting, e.g. removing trapped air

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

61/439 . . . . . . . Control of the neutral position, e.g. by zero tilt rotation holding means

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

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
Control of gearings conveying rotary motion

Control of gearings conveying rotary motion

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 . . . hydrodynamic
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- shiftabl e 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 a clutch in the connection between runners (F16H 61/60) taking precedence; combinations of fluid gearings for conveying rotary motion with mechanical clutches for bridging a fluid gearing of the hydrokinetic type (F16H 45/02)

61/64 . . . controlled by changing the amount of liquid in the working circuit

61/66 . . . . specially adapted for continuously variable gearings (control of exclusively fluid gearing F16H 61/38)
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 at hard braking]
2061/6607 . . . . [for engine braking]
2061/6609 . . . . [Control of clutch or clutches for forward-reverse shift]
2061/661 . . . . [Control of clutches or brakes in torque split transmissions]
2061/6611 . . . . [Conjoint control of CVTs and drive clutch]
2061/6612 . . . . [Control of ratio during dual or multiple pass shifting for enlarged ration coverage]
2061/6615 . . . . [the shifting of the transmission being manually controlled]
2061/6616 . . . . [Manual control of CVTs while continuously varying the ratio]
2061/6618 . . . . [Protecting CVTs against overload by limiting clutch capacity, e.g. torque fuse]
61/682 . . . . with endless flexible members
61/66204 . . . . [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]
2061/66222 . . . . [the ratio is varied in order to reduce surface wear of belt or pulley]
61/66227 . . . . [controlling shifting exclusively as a function of speed and torque]
61/66231 . . . . [controlling shifting exclusively as a function of speed]
61/66236 . . . . [using electrical or electronical 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]
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 hydraulic 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]

2061/664 . . . . Friction gears
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
Control of gearings conveying rotary motion

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 . . . [Reassembled gear 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 ([constructional features 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 ([constructional features 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 grooves 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 ([constructional features 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 ([constructional features 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]

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]
Control of gearings conveying rotary motion

- Shift rod assembly, e.g. supporting, assembly or manufacturing of shift rails or rods; Special details thereof
- Shift finger arrangements, e.g. shape or attachment of shift fingers
- Shift head arrangements, e.g. forms or arrangements of shift heads for preselection or shifting
- Spring assisted shift, e.g. springs for accumulating energy of shift movement and release it when clutch teeth are aligned
- 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)

- Sliding keys as final output elements; Details thereof
- Gear shift yokes, [e.g. shift forks]
- [characterised by the interface between fork body and shift rod, e.g. fixing means, bushes, cams or pins]
- [characterised by catches or notches for moving the fork]
- [characterised by slide shoes, or similar means to transfer shift force to sleeve]
- [Rockers or swiveling forks, i.e. the forks are pivoted in the gear case when moving the sleeve]
- [essentially made of sheet metal]
- [essentially made of plastics, e.g. injection molded]
- Locking or disabling mechanisms
- [the locking mechanism being moved by the final actuating mechanism]
- [Parking lock mechanisms or brakes in the transmission]
- [characterised by pawls or wheels]
- [Details of latch mechanisms, e.g. for keeping pawls out of engagement]
- [Parking locks engaging axially]
- [using friction brakes, e.g. a band brakes]
- [with electric actuating means, e.g. shift by wire]
- [using electric motors]
- [using solenoids]
- [with hydraulic actuating means]
- [Emergency release or engagement of parking locks or brakes]
- Interlocking devices
- Detents ([spring-loaded ball units for holding levers in a limited number of positions G05G 5/065])
- comprising signals other than signals for actuating the final output mechanisms
- Ratio indicator devices
- [Range indicators for automatic transmissions, e.g. showing selected range or mode]
- [with means for advising the driver for proper shift action, e.g. prompting the driver with allowable selection range of ratios]
- Signals to the control unit of auxiliary gearing
- Signals to a clutch outside the gearbox

Signals to a parking brake {or parking lock; Control of parking locks or brakes being part of the transmission}
Signals to an engine or motor
{for smoothing gear shifts}
{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}
{for engine torque resume after shift transition, e.g. a resume adapted to the driving style}
{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
- Transmissions using gears with orbital motion
- characterised by the number of sets of orbital gears
- with one sets of orbital gears
- with two sets of orbital gears
- with three sets of orbital gears
- with four sets of orbital gears
- with five sets of orbital gears
- with six sets of orbital gears
- characterised by the type of Ravigneaux set
- using a Ravigneaux set with 4 connections
- using a Ravigneaux set with 5 connections
- using a Ravigneaux set with 6 connections
- characterised by the engaging friction means not of the freewheel type, e.g. friction clutches or brakes
Determine the way or trajectory to a new ratio F16H 2302/00

Preparing the opening or release of the torque transmitting element

Interruption of shift, e.g. if new shift is initiated during ongoing previous shift

Preparing coupling or engaging of future gear

Preparing coupling or engaging of future gear with planetary gearing

Combining of transmissions with parallel force dividing devices

Driving activities

Driving off

Preparing to drive off

Holding or hillholding

Creeping

Rocking

Switching between forward and reverse (rocking)

Inching

Parking

Going to, or coming from standby operation, e.g. for engine start-stop operation at traffic lights

Coming to a halt

Strong or emergency braking

Start-up or shut-down

Calibrating

Calibrating shift or range movements

Calibrating engagement of friction elements

Torque transmitting capability

Determining which part to calibrate or timing of calibrations

Calibrating valves

Transmission housings and mounting of transmission components therein; Cooling; Lubrication; Flexible suspensions, e.g. floating frames

Transmissions, specially for working vehicles

Starting devices or devices to start turning of shafts

Protections for shifting mechanical transmissions

Combinations of two or more transmissions

Mechanical transmissions with planetary gearing combined with one or more other mechanical transmissions

Combinations of a speed-change mechanism without planetary gearing with a differential for driving a vehicle drive axle

Combinations of transmissions with parallel force splitting paths having same output

Control mechanisms and elements applying a mechanical movement

Speed-change devices wherein the control lever actuates directly sliding gears pivoting around two non-parallel axes

Speed-change devices with an intermediary mechanism placed between control member and actuator
Control devices for speed-changing geared mechanisms, e.g. specially adapted couplings for synchronising devices, devices to simplify control, control of auxiliary gearboxes

- only the toothed wheels remain engaged
- the control being mechanical
- the control being hydraulic or pneumatic
- the control being electric
- wherein the gearing is not described or not essential
- the control being mechanical
- the control being hydraulic or pneumatic
- the control being electric
- with a preselection system, mainly semi-automatic, e.g. with automatic preselection, but controlled at the intended moment, with force amplification

Control devices for speed-change mechanisms, the speed change control is dependent on function parameters of the gearing

- Control dependent on speed and torque, wherein only the toothed wheels remain engaged, control being mechanical
- 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
- Control dependent on speed, wherein only the toothed wheels may be disengaged, control being mechanical
- wherein only the toothed wheels remain engaged, control being mechanical

Mechanisms for changing direction

- Automatic control, e.g. for an alternating movement
- the control being hydraulic or pneumatic
- only with toothed wheels or friction wheels
- only the toothed wheels may be disengaged
- with a combination of engaged and disengageable toothed wheels

Different types speed-changing mechanisms for toothed gearing

- only with toothed wheels remaining engaged
- with specially adapted devices

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

- the control being mechanical
- the control being hydraulic or pneumatic
- Circuits thereof
- the control being electric
- only the toothed wheels may be disengaged, the control being mechanical
- with preselection system, mainly semi-automatic, e.g. with automatic preselection, but controlled at the intended moment, with force amplification
- only with toothed wheels remaining engaged

Mechanisms for speed-change of planetary gearing, the speed change control being dependent on function parameters of the gearing

- Control dependent on speed and torque, wherein only the toothed wheels remain engaged
- the control being mechanical
- the control being hydraulic or pneumatic
- 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
- 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