SECTION F — MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING

F16 ENGINEERING ELEMENTS OR UNITS; GENERAL MEASURES FOR PRODUCING AND MAINTAINING EFFECTIVE FUNCTIONING OF MACHINES OR INSTALLATIONS; THERMAL INSULATION IN GENERAL

F16H GEARING

Note(s) [5, 2009.01]

1. Combinations including mechanical gearings are classified in groups F16H 37/00or 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 harvesters or mowers
   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
   F01-F04.....Machines, engines, pumps
   F15B 15/00.....Gearings associated with fluid-actuated devices
   G01D 5/04.....Gearing 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.

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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, 2006.01]**

1/02 • without gears having orbital motion **[1, 2006.01]**

1/04 • • involving only two intermeshing members **[1, 2006.01]**

1/06 • • • with parallel axes **[1, 2006.01]**

1/08 • • • • the members having helical, herring-bone, or like teeth **[1, 2006.01]**

1/10 • • • • one of the members being internally toothed **[1, 2006.01]**

1/12 • • • with non-parallel axes **[1, 2006.01]**

1/14 • • • • comprising conical gears only **[1, 2006.01]**

1/16 • • • • comprising worm and worm-wheel **[1, 2006.01]**

1/18 • • • • the members having helical, herring-bone, or like teeth (F16H 1/14 takes precedence) **[1, 2006.01]**

1/20 • • involving more than two intermeshing members **[1, 2006.01]**

1/22 • • • with a plurality of driving or driven shafts; with arrangements for dividing torque between two or more intermediate shafts **[1, 2006.01]**

1/24 • • involving gears essentially having intermeshing elements other than involute or cycloidal teeth (F16H 1/16 takes precedence) **[1, 2006.01]**

1/26 • • Special means compensating for misalignment of axes **[1, 2006.01]**

1/28 • with gears having orbital motion **[1, 2006.01]**

1/30 • • in which an orbital gear has an axis crossing the main axis of the gearing and has helical teeth or is a worm **[1, 2006.01]**

1/32 • • in which the central axis of the gearing lies inside the periphery of an orbital gear **[1, 2006.01]**

1/34 • • involving gears essentially having intermeshing elements other than involute or cycloidal teeth (in worm gearing F16H 1/30) **[1, 2006.01]**

1/36 • • with two central gears coupled by intermeshing orbital gears **[1, 2006.01]**

1/46 • • Systems consisting of a plurality of gear trains, each with orbital gears **[1, 2006.01]**

1/48 • • Special means compensating for misalignment of axes **[1, 2006.01]**

3/00 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) **[1, 2006.01]**

3/02 • without gears having orbital motion **[1, 2006.01]**

3/04 • • with internally-toothed gears **[1, 2006.01]**

3/06 • • with worm and worm-wheel or gears essentially having helical or herring-bone teeth **[1, 2006.01]**

3/08 • • exclusively or essentially with continuously-meshing gears, that can be disengaged from their shafts **[1, 2006.01]**

Note(s) [2006.01]

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

3/083 • • • with radially acting and axially controlled clutching members, e.g. sliding keys **[5, 2006.01]**

3/085 • • • with more than one output shaft **[5, 2006.01]**

3/087 • • • characterised by the disposition of the gears (F16H 3/083, F16H 3/085 take precedence) **[5, 2006.01]**

Note(s) [5]

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 **[5, 2006.01]**

3/091 • • • • including a single countershaft **[5, 2006.01]**

3/093 • • • • with two or more countershafts **[5, 2006.01]**

3/095 • • • • • with means for ensuring an even distribution of torque between the countershafts **[5, 2006.01]**

3/097 • • • • • the input and output shafts being aligned on the same axis **[5, 2006.01]**

3/10 • • • with one or more one-way clutches as an essential feature **[1, 2006.01]**

3/12 • • • with means for synchronisation not incorporated in the clutches (synchronised clutches F16D 23/02) **[1, 2006.01]**

3/14 • • • Gearings for reversal only **[1, 2006.01]**

3/16 • • essentially with both gears that can be put out of gear and continuously-meshing gears that can be disengaged from their shafts **[1, 2006.01]**

Note(s) [2006.01]

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 **[1, 2006.01]**

3/20 • • exclusively or essentially using gears that can be moved out of gear **[1, 2006.01]**

Note(s) [2006.01]

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 **[1, 2006.01]**

3/24 • • • • with driving and driven shafts coaxial **[1, 2006.01]**

3/26 • • • • • and two or more additional shafts **[1, 2006.01]**

3/28 • • • • • • an additional shaft being coaxial with the main shafts **[1, 2006.01]**

3/30 • • • • with driving and driven shafts not coaxial **[1, 2006.01]**

3/32 • • • • • and an additional shaft **[1, 2006.01]**

3/34 • • • with gears shiftable otherwise than only axially **[1, 2006.01]**

3/36 • • • with a single gear meshable with any of a set of coaxial gears of different diameters **[1, 2006.01]**
3/38 • • • with synchro-meshing **[1, 2006.01]**
3/40 • • • Gearings for reversal only **[1, 2006.01]**
3/42 • • with gears having teeth formed or arranged for obtaining multiple gear ratios, e.g. nearly infinitely variable **[1, 2006.01]**
3/44 • using gears having orbital motion **[1, 2006.01]**
3/46 • • Gearings having only two central gears, connected by orbital gears (F16H 3/68-F16H 3/78 take precedence) **[1, 2006.01]**
3/48 • • • with single orbital gears or pairs of rigidly-connected orbital gears **[1, 2006.01]**
3/50 • • • • comprising orbital conical gears **[1, 2006.01]**
3/52 • • • • comprising orbital spur gears **[1, 2006.01]**
3/54 • • • • • one of the central gears being internally toothed and the other externally toothed **[1, 2006.01]**
3/56 • • • • • both central gears being sun gears **[1, 2006.01]**
3/58 • • • with sets of orbital gears, each consisting of two or more intermeshing orbital gears **[1, 2006.01]**
3/60 • • • Gearings for reversal only **[1, 2006.01]**
3/62 • • Gearings having three or more central gears (F16H 3/68-F16H 3/78 take precedence) **[1, 2006.01]**
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 **[1, 2006.01]**
3/66 • • • composed of a number of gear trains without drive passing from one train to another **[1, 2006.01]**
3/68 • • in which an orbital gear has an axis crossing the main axis of the gearing and has helical teeth or is a worm **[1, 2006.01]**
3/70 • • in which the central axis of the gearing lies inside the periphery of an orbital gear **[1, 2006.01]**
3/72 • • with a secondary drive, e.g. regulating motor, in order to vary speed continuously **[1, 2006.01]**
3/74 • • Complexes, not using actuatable speed-changing or regulating members, e.g. with gear ratio determined by free play of frictional or other forces **[1, 2006.01]**
3/76 • • with an orbital gear having teeth formed or arranged for obtaining multiple gear ratios, e.g. nearly infinitely variable **[1, 2006.01]**
3/78 • • Special adaptation of synchronisation mechanisms to these gearings **[1, 2006.01]**

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 9/00; endless flexible members per se, e.g. belts or chains F16G) **[1, 2006.01]**
7/02 • with belts; with V-belts **[1, 2006.01]**
7/04 • with ropes **[1, 2006.01]**
7/06 • with chains **[1, 2006.01]**
7/08 • Means for varying tension of belts, ropes, or chains (pulleys of adjustable construction F16H 55/52) **[1, 2006.01]**
7/10 • • by adjusting the axis of a pulley **[1, 2006.01]**
7/12 • • • of an idle pulley **[1, 2006.01]**
7/14 • • • of a driving or driven pulley **[1, 2006.01]**
7/16 • • • • without adjusting the driving or driven shaft **[1, 2006.01]**
7/18 • Means for guiding or supporting belts, ropes, or chains (construction of pulleys F16H 55/36) **[1, 2006.01]**
7/20 • • Mountings for rollers or pulleys **[1, 2006.01]**
7/22 • Belt, rope, or chain shifters **[1, 2006.01]**
7/24 • Equipment for mounting belts, ropes, or chains **[1, 2006.01]**

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; endless flexible members per se, e.g. belts or chains F16G) **[1, 2006.01]**
9/02 • without members having orbital motion **[1, 2006.01]**
9/04 • • using belts, V-belts, or ropes (with toothed belts F16H 9/24; pulleys of adjustable construction F16H 55/52) **[1, 2006.01]**
9/06 • • • engaging a stepped pulley **[1, 2006.01]**
9/08 • • • engaging a conical drum (F16H 9/12 takes precedence) **[1, 2006.01]**
9/10 • • • engaging a pulley provided with radially-actuatable elements carrying the belt **[1, 2006.01]**
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 **[1, 2006.01]**
9/14 • • • • using only one pulley built-up out of adjustable conical parts **[1, 2006.01]**
9/16 • • • • using two pulleys, both built-up out of adjustable conical parts **[1, 2006.01]**
9/18 • • • • • only one flange of each pulley being adjustable **[1, 2006.01]**
9/20 • • • • • both flanges of the pulleys being adjustable **[1, 2006.01]**
9/22 • • • specially adapted for ropes **[1, 2006.01]**
9/24 • • using chains, toothed belts, belts in the form of links; Chains or belts specially adapted to such gearing (toothed belts F16G 1/28; V-belts in the form of links F16G 5/18; toothed V-belts F16G 5/20) **[1, 2006.01]**
9/26 • with members having orbital motion **[1, 2006.01]**

Other friction gearing for conveying rotary motion

13/00 Gearing for conveying rotary motion with constant gear ratio by friction between rotary members (specific for conveying rotary motion with variable gear ratio or for reversing rotary motion F16H 15/00) **[1, 2006.01]**
13/02 • without members having orbital motion **[1, 2006.01]**
13/04 • • with balls or with rollers acting in a similar manner **[1, 2006.01]**
13/06 • with members having orbital motion **[1, 2006.01]**
13/08 • • with balls or with rollers acting in a similar manner **[1, 2006.01]**
13/10 • Means for influencing the pressure between the members **[1, 2006.01]**
13/12 • • by magnetic forces **[1, 2006.01]**
13/14 • • for automatically varying the pressure mechanically **[1, 2006.01]**

15/00 **Gearings for conveying rotary motion with variable gear ratio, or for reversing rotary motion, by friction between rotary members** (control of change-speed or reversing-gearings conveying rotary motion F16H 59/00-F16H 63/00) **[1, 2006.01]**

15/01 • characterised by the use of a magnetisable powder or liquid as friction medium between the rotary members **[2, 2006.01]**

15/02 • without members having orbital motion **[1, 2006.01]**

15/04 • • Gearings providing a continuous range of gear ratios **[1, 2006.01]**

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 **[1, 2006.01]**

15/08 • • • • in which the member B is a disc with a flat or approximately-flat friction surface **[1, 2006.01]**

15/10 • • • • • in which the axes of the two members cross or intersect **[1, 2006.01]**

15/12 • • • • • • in which one or each member is duplicated, e.g. for obtaining better transmission, for lessening the reaction forces on the bearings **[1, 2006.01]**

15/14 • • • • • in which the axes of the members are parallel or approximately parallel **[1, 2006.01]**

15/16 • • • • in which the member B has a conical friction surface **[1, 2006.01]**

15/18 • • • • • externally **[1, 2006.01]**

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 **[1, 2006.01]**

15/22 • • • • • • the axes of the members being parallel or approximately parallel **[1, 2006.01]**

15/24 • • • • • internally **[1, 2006.01]**

15/26 • • • • in which the member B has a spherical friction surface centered on its axis of revolution **[1, 2006.01]**

15/28 • • • • • with external friction surface **[1, 2006.01]**

15/30 • • • • • with internal friction surface **[1, 2006.01]**

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 **[1, 2006.01]**

15/34 • • • • • with convex friction surface **[1, 2006.01]**

15/36 • • • • • with concave friction surface, e.g. a hollow toroid surface **[1, 2006.01]**

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 **[1, 2006.01]**

15/40 • • • in which two members co-operate by means of balls, or rollers of uniform effective diameter, not mounted on shafts **[1, 2006.01]**

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 **[1, 2006.01]**

15/44 • • • in which two members of non-uniform effective diameter directly co-operate with one another **[1, 2006.01]**

15/46 • • Gearings providing a discontinuous or stepped range of gear ratios **[1, 2006.01]**

15/48 • with members having orbital motion **[1, 2006.01]**

15/50 • • Gearings providing a continuous range of gear ratios **[1, 2006.01]**

15/52 • • • in which a member of uniform effective diameter mounted on a shaft may co-operate with different parts of another member **[1, 2006.01]**

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 **[1, 2006.01]**

15/56 • • Gearings providing a discontinuous or stepped range of gear ratios **[1, 2006.01]**

19/00 **Gearings comprising essentially only toothed gears or friction members and not capable of conveying indefinitely-continuing rotary motion** (with intermittently-driving members F16H 27/00-F16H 31/00; rope or like tackle for lifting or haulage B66D 3/00) **[1, 2006.01]**

19/02 • for interconverting rotary motion and reciprocating motion **[1, 2006.01]**

19/04 • • comprising a rack **[1, 2006.01]**

19/06 • • comprising an endless flexible member **[1, 2006.01]**

19/08 • for interconverting rotary motion and oscillating motion **[1, 2006.01]**

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

21/00 **Gearings comprising primarily only links or levers, with or without slides** (F16H 23/00 takes precedence) **[1, 2006.01]**

21/02 • the movements of two or more independently-moving members being combined into a single movement **[1, 2006.01]**

21/04 • Guiding mechanisms, e.g. for straight-line guidance (for drawing-machines B43L) **[1, 2006.01]**

21/06 • which can be made ineffective when desired **[1, 2006.01]**

21/08 • • by pushing a reciprocating rod out of its operative position **[1, 2006.01]**

21/10 • all movement being in, or parallel to, a single plane **[1, 2006.01]**

21/12 • • for conveying rotary motion **[1, 2006.01]**

21/14 • • • by means of cranks, eccentrics, or like members fixed to one rotary member and guided along tracks on the other **[1, 2006.01]**

21/16 • • for interconverting rotary motion and reciprocating motion **[1, 2006.01]**

21/18 • • • Crank gearings; Eccentric gearings **[1, 2006.01]**

21/20 • • • • with adjustment of throw (adjustable cranks or eccentrics F16C 3/28; adjustable connecting-rods F16C 7/06) **[1, 2006.01]**

21/22 • • • • with one connecting-rod and one guided slide to each crank or eccentric **[1, 2006.01]**

21/24 • • • • • without further links or guides **[1, 2006.01]**

21/26 • • • • • with toggle action **[1, 2006.01]**

21/28 • • • • • with cams or additional guides **[1, 2006.01]**

21/30 • • • • • with members having rolling contact **[1, 2006.01]**

21/32 • • • • • with additional members comprising only pivoted links or arms **[1, 2006.01]**

21/34 • • • • with two or more connecting-rods to each crank or eccentric **[1, 2006.01]**

21/36 • • • • without swinging connecting-rod, e.g. with epicyclic parallel motion, slot-and- crank motion **[1, 2006.01]**

21/38 • • • • with means for temporary energy accumulation, e.g. to overcome dead-centre positions **[1, 2006.01]**

21/40 • • for interconverting rotary motion and oscillating motion **[1, 2006.01]**

21/42 • • • with adjustable throw **[1, 2006.01]**

21/44 • • for conveying or interconverting oscillating or reciprocating motions **[1, 2006.01]**

21/46 • with movements in three dimensions **[1, 2006.01]**

21/48 • • for conveying rotary motion **[1, 2006.01]**

21/50 • • for interconverting rotary motion and reciprocating motion **[1, 2006.01]**

21/52 • • for interconverting rotary motion and oscillating motion **[1, 2006.01]**

21/54 • • for conveying or interconverting oscillating or reciprocating motions **[1, 2006.01]**

23/00 Wobble-plate gearings; Oblique-crank gearings [1, 2006.01]

23/02 • with adjustment of throw by changing the position of the wobble-member (F16H 29/04, F16H 33/10 take precedence) **[1, 2006.01]**

23/04 • with non-rotary wobble-members **[1, 2006.01]**

23/06 • • with sliding members hinged to reciprocating members **[1, 2006.01]**

23/08 • • connected to reciprocating members by connecting-rods **[1, 2006.01]**

23/10 • with rotary wobble-plates with plane surfaces **[1, 2006.01]**

25/00 Gearings comprising primarily only cams, cam-followers and screw-and-nut mechanisms [1, 2006.01]

25/02 • the movements of two or more independently-moving members being combined into a single movement **[1, 2006.01]**

25/04 • for conveying rotary motion **[1, 2006.01]**

25/06 • • with intermediate members guided along tracks on both rotary members **[1, 2006.01]**

25/08 • for interconverting rotary motion and reciprocating motion (F16H 23/00 takes precedence) **[1, 2006.01]**

25/10 • • with adjustable throw (adjustable cams F16H 53/04) **[1, 2006.01]**

25/12 • • with reciprocation along the axis of rotation, e.g. gearings with helical grooves and automatic reversal (screw mechanisms without automatic reversal F16H 25/20) **[1, 2006.01]**

25/14 • • with reciprocation perpendicular to the axis of rotation (F16H 21/36 takes precedence) **[1, 2006.01]**

25/16 • for interconverting rotary motion and oscillating motion **[1, 2006.01]**

25/18 • for conveying or interconverting oscillating or reciprocating motions **[1, 2006.01]**

25/20 • • Screw mechanisms (with automatic reversal F16H 25/12) **[1, 2006.01]**

25/22 • • • with balls, rollers, or similar members between the co-operating parts; Elements essential to the use of such members **[1, 2006.01]**

25/24 • • • Elements essential to such mechanisms, e.g. screws, nuts (F16H 25/22 takes precedence) **[1, 2006.01]**

Gearings with intermittently-driving members

27/00 Step-by-step mechanisms without freewheel members, e.g. Geneva drives (rotary gearings with cyclically-varying velocity ratio F16H 35/02; impulse couplings F16D 5/00; clockwork escapements G04B 15/00) **[1, 2006.01]**

27/02 • with at least one reciprocating or oscillating transmission member **[1, 2006.01]**

27/04 • for converting continuous rotation into a step-by-step rotary movement **[1, 2006.01]**

27/06 • • Mechanisms with driving pins in driven slots, e.g. Geneva drives **[1, 2006.01]**

27/08 • • with driving toothed gears with interrupted toothing **[1, 2006.01]**

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 **[1, 2006.01]**

29/00 Gearings for conveying rotary motion with intermittently-driving members, e.g. with freewheel action (freewheels F16D 41/00) **[1, 2006.01]**

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) **[1, 2006.01]**

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 **[1, 2006.01]**

29/06 • • • with concentric shafts, an annular intermediate member moving around and being supported on an adjustable crank or eccentric **[1, 2006.01]**

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 **[1, 2006.01]**

29/10 • • in which the transmission ratio is changed by directly acting on the intermittently driving members **[1, 2006.01]**

29/12 • between rotary driving and driven members (F16H 29/20, F16H 29/22 take precedence) **[1, 2006.01]**

29/14 • • in which the transmission ratio is changed by adjustment of an otherwise stationary guide member for the intermittently-driving members **[1, 2006.01]**

29/16 • • in which the transmission ratio is changed by adjustment of the distance between the axes of the rotary members **[1, 2006.01]**

29/18 • • • in which the intermittently-driving members slide along approximately radial guides while rotating with one of the rotary members **[1, 2006.01]**

29/20 • the intermittently-acting members being shaped as worms, screws, or racks **[1, 2006.01]**

29/22 • with automatic speed change **[1, 2006.01]**

31/00 Other gearings with freewheeling members or other intermittently-driving members (F16H 21/00, F16H 23/00, F16H 25/00 take precedence; gearings involving the use of automatic changing-mechanisms, e.g. cyclically-actuated reversal gearings, see the appropriate groups) **[1, 2006.01]**

33/00 Gearings based on repeated accumulation and delivery of energy [1, 2006.01]

33/02 • Rotary transmissions with mechanical accumulators, e.g. weights, springs, intermittently-connected flywheels **[1, 2006.01]**

33/04 • • Gearings for conveying rotary motion with variable velocity ratio, in which self-regulation is sought **[1, 2006.01]**

33/06 • • • based essentially on spring action (ratchet slip couplings F16D 7/04) **[1, 2006.01]**

33/08 • • • based essentially on inertia **[1, 2006.01]**

33/10 • • • • with gyroscopic action, e.g. comprising wobble-plates, oblique cranks **[1, 2006.01]**

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 **[1, 2006.01]**

33/14 • • • • having orbital members influenced by regulating masses **[1, 2006.01]**

33/16 • • • • • which have their own free motion, or consist of fluid **[1, 2006.01]**

33/18 • • • • • of which the motion is constrained **[1, 2006.01]**

33/20 • for interconversion, based essentially on inertia, of rotary motion and reciprocating or oscillating motion **[1, 2006.01]**

35/00 Gearings or mechanisms with other special functional features [1, 2006.01]

35/02 • for conveying rotary motion with cyclically-varying velocity ratio (speed-changing mechanisms operating cyclically, see the appropriate groups) **[1, 2006.01]**

35/06 • Gearings designed to allow relative movement between supports thereof without ill effects (F16H 1/26, F16H 1/48 take precedence) **[1, 2006.01]**

35/08 • for adjustment of members on moving parts from a stationary place **[1, 2006.01]**

35/10 • Arrangements or devices for absorbing overload or preventing damage by overload (couplings for transmitting rotation F16D) **[1, 2006.01]**

35/12 • Transmitting mechanisms with delayed effect (vibration- or shock-dampers in general F16F) **[1, 2006.01]**

35/14 • Mechanisms with only two stable positions, e.g. acting at definite angular positions **[1, 2006.01]**

35/16 • Mechanisms for movements or movement relations conforming to mathematical formulae (devices in which computing operations are performed mechanically G06G 3/00) **[1, 2006.01]**

35/18 • Turning devices for rotatable members, e.g. shafts (starting devices for internal-combustion engines F02N) **[1, 2006.01]**

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 47/00; applications of underdrives or overdrives in motor vehicles, combinations with differential gearings in motor vehicles B60K) **[1, 2006.01]**

37/02 • comprising essentially only toothed or friction gearings **[1, 2006.01]**

37/04 • • Combinations of toothed gearings only (F16H 37/06 takes precedence) **[1, 2006.01]**

37/06 • • with a plurality of driving or driven shafts; with arrangements for dividing torque between two or more intermediate shafts **[1, 2006.01]**

37/08 • • • with differential gearing **[1, 2006.01]**

37/10 • • • • at both ends of intermediate shafts **[1, 2006.01]**

37/12 • Gearings comprising primarily toothed or friction gearing, links or levers, and cams, or members of at least two of these three types (F16H 21/14, F16H 21/28, F16H 21/30 take precedence; toothed or friction gearing or cam gearing, with only an additional lever or link, see the appropriate group for the main gearing) **[1, 2006.01]**

37/14 • • the movements of two or more independently-moving members being combined into a single movement **[1, 2006.01]**

37/16 • • with a driving or driven member which both rotates or oscillates on its axis and reciprocates **[1, 2006.01]**

Fluid gearing [3]

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; fluid couplings or clutches with pumping sets of volumetric type F16D 31/00; application to lifting or pushing equipment B66F) **[1, 5, 2006.01]**

39/01 • Pneumatic gearing; Gearing working with subatmospheric pressure (pneumatic hammers B25D 9/00) **[2, 2006.01]**

39/02 • with liquid motors at a distance from liquid pumps **[1, 2006.01]**

39/04 • with liquid motor and pump combined in one unit **[1, 2006.01]**

39/06 • • pump and motor being of the same type **[1, 2006.01]**

39/08 • • • each with one main shaft and provided with pistons reciprocating in cylinders **[1, 2006.01]**

39/10 • • • • with cylinders arranged around, and parallel or approximately parallel to, the main axis of the gearing **[1, 2006.01]**

39/12 • • • • • with stationary cylinders **[1, 2006.01]**

39/14 • • • • • with cylinders carried in rotary cylinder blocks or cylinder-bearing members **[1, 2006.01]**

39/16 • • • • with cylinders arranged perpendicular to the main axis of the gearing **[1, 2006.01]**

39/18 • • • • • the connections of the pistons being at the outer ends of the cylinders **[1, 2006.01]**

39/20 • • • • • the connections of the pistons being at the inner ends of the cylinders **[1, 2006.01]**

39/22 • • • with liquid chambers shaped as bodies of revolution concentric with the main axis of the gearing **[1, 2006.01]**

39/24 • • • • with rotary displacement members, e.g. provided with axially or radially movable vanes passing movable sealing members **[1, 2006.01]**

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 **[1, 2006.01]**

39/28 • • • • with liquid chambers formed in rotary members **[1, 2006.01]**

39/30 • • • • with liquid chambers formed in stationary members **[1, 2006.01]**

39/32 • • • • • with sliding vanes carried by the rotor **[1, 2006.01]**

39/34 • • • in which a rotor on one shaft co-operates with a rotor on another shaft **[1, 2006.01]**
39/36 • • • • toothed-gear type **[1, 2006.01]**
39/38 • • • • Displacement screw-pump type **[1, 2006.01]**
39/40 • • • Hydraulic differential gearings, e.g. having a rotary input housing with interconnected liquid chambers for both outputs **[1, 2006.01]**
39/42 • • pump and motor being of different types **[1, 2006.01]**

41/00 Rotary fluid gearing of the hydrokinetic type (control of exclusively fluid gearing F16H 61/38; rotary fluid couplings or clutches of the hydrokinetic type F16D 33/00) **[1, 5, 2006.01]**
41/02 • with pump and turbine connected by conduits or ducts **[1, 2006.01]**
41/04 • Combined pump-turbine units **[1, 2006.01]**
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 **[1, 2006.01]**
41/24 • Details **[1, 2006.01]**
41/26 • • Shape of runner blades or channels with respect to function **[1, 2006.01]**
41/28 • • with respect to manufacture, e.g. blade attachment **[1, 2006.01]**
41/30 • • relating to venting, lubrication, cooling, circulation of the cooling medium **[1, 2006.01]**
41/32 • Selection of working fluids (chemical aspects, see the relevant classes) **[1, 2006.01]**

43/00 Other fluid gearing, e.g. with oscillating input or output [1, 2, 2006.01]
43/02 • Fluid gearing actuated by pressure waves **[2, 2006.01]**

45/00 Combinations of fluid gearings for conveying rotary motion with couplings or clutches (F16H 41/22 takes precedence; conjoint control of driveline clutches and change-speed gearing in vehicles B60W 10/02, B60W 10/10) **[1, 2, 2006.01]**

Note(s)

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

45/02 • with mechanical clutches for bridging a fluid gearing of the hydrokinetic type (control of torque converter lock-up clutches F16H 61/14) **[1, 2006.01]**

47/00 Combinations of mechanical gearing with fluid clutches or fluid gearing (conjoint control of driveline clutches and change-speed gearing in vehicles B60W 10/02, B60W 10/10) **[1, 2, 2006.01]**
47/02 • the fluid gearing being of the volumetric type **[1, 2006.01]**
47/04 • • the mechanical gearing being of the type with members having orbital motion **[1, 2006.01]**
47/06 • the fluid gearing being of the hydrokinetic type **[1, 2006.01]**
47/07 • • using two or more power-transmitting fluid circuits (F16H 47/10 takes precedence) **[2, 2006.01]**
47/08 • • the mechanical gearing being of the type with members having orbital motion **[1, 2006.01]**
47/10 • • • using two or more power-transmitting fluid circuits **[2, 2006.01]**
47/12 • • • the members with orbital motion having vanes interacting with the fluid **[2, 2006.01]**

48/00 Differential gearings (cooling or lubricating of differential gearing F16H 57/04) **[6, 2006.01, 2012.01]**

Note(s) [2012.01]

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

48/05 • Multiple interconnected differential sets **[2012.01]**
48/06 • with gears having orbital motion **[6, 2006.01]**
48/08 • • with orbital conical gears **[6, 2006.01]**
48/10 • • with orbital spur gears **[6, 2006.01, 2012.01]**
48/11 • • • having intermeshing planet gears **[2012.01]**
48/12 • without gears having orbital motion **[6, 2006.01, 2012.01]**
48/14 • • with cams **[6, 2006.01]**
48/16 • • with freewheels **[6, 2006.01]**
48/18 • • with fluid gearing **[6, 2006.01]**
48/19 • • consisting of two linked clutches **[2012.01]**
48/20 • Arrangements for suppressing or influencing the differential action, e.g. locking devices **[6, 2006.01, 2012.01]**
48/22 • • using friction clutches or brakes **[6, 2006.01]**
48/24 • • using positive clutches or brakes **[6, 2006.01]**
48/26 • • using fluid action, e.g. viscous clutches **[6, 2006.01]**
48/27 • • using internally-actuatable fluid pressure, e.g. internal pump types **[2012.01]**
48/28 • • using self-locking gears or self-braking gears **[6, 2006.01, 2012.01]**
48/285 • • • with self-braking intermeshing gears having parallel axes and having worms or helical teeth **[2012.01]**
48/29 • • • with self-braking intermeshing gears having perpendicular arranged axes and having worms or helical teeth **[2012.01]**
48/295 • • using multiple means for force boosting **[2012.01]**
48/30 • • using externally-actuatable means **[6, 2006.01, 2012.01]**
48/32 • • • using fluid pressure actuators **[2012.01]**
48/34 • • • using electromagnetic or electric actuators **[2012.01]**
48/36 • characterised by intentionally generating speed difference between outputs **[2012.01]**
48/38 • Constructional details (the outer casing comprising the differential and supporting input and output shafts F16H 57/037) **[2012.01]**
48/40 • • characterised by features of the rotating cases **[2012.01]**
48/42 • • characterised by features of the input shafts, e.g. mounting of drive gears thereon **[2012.01]**

49/00 Other gearing [1, 2006.01]

Details of gearing or mechanisms

51/00 Levers of gearing mechanisms (shafts, Bowden mechanisms, cranks, eccentrics, bearings, pivotal connections, crossheads, connecting-rods F16C; manipulating levers G05G) **[1, 2006.01]**
51/02 • adjustable **[1, 2006.01]**

53/00 Cams or cam-followers, e.g. rollers for gearing mechanisms (shafts, Bowden mechanisms, cranks, eccentrics, bearings, pivotal connections, crossheads, connecting-rods F16C; cams specially adapted for reciprocating-piston liquid engines F03C 1/30) **[1, 2006.01]**

53/02 • Single-track cams for single-revolution cycles; Camshafts with such cams **[1, 2006.01]**
53/04 • • Adjustable cams **[1, 2006.01]**
53/06 • Cam-followers (F16H 53/08 takes precedence) **[1, 2006.01]**
53/08 • Multi-track cams, e.g. for cycles consisting of several revolutions; Cam-followers specially adapted for such cams **[1, 2006.01]**

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; shafts, Bowden mechanisms, cranks, eccentrics, bearings, pivotal connections, crossheads, connecting-rods F16C; chains, belts F16G; pulley-blocks for lifting or hauling appliances B66D 3/04) **[1, 4, 2006.01]**
55/02 • Toothed members; Worms **[1, 2006.01]**
55/06 • • Use of materials; Use of treatments of toothed members or worms to affect their intrinsic material properties **[1, 3, 2006.01]**
55/08 • • Profiling **[1, 3, 2006.01]**
55/10 • • Constructively simple tooth shapes, e.g. shaped as pins, as balls **[1, 3, 2006.01]**
55/12 • • with body or rim assembled out of detachable parts **[1, 3, 2006.01]**
55/14 • • Construction providing resilience or vibration-damping (F16H 55/06 takes precedence; resilient coupling of wheel or wheel-rim with shaft F16D 3/50, F16D 3/80) **[1, 3, 2006.01]**
55/16 • • • relating to teeth only **[1, 3, 2006.01]**
55/17 • • Toothed wheels (worm wheels F16H 55/22; chain wheels F16H 55/30) **[3, 2006.01]**
55/18 • • • Special devices for taking-up backlash **[1, 2006.01]**
55/20 • • • • for bevel gears **[1, 2006.01]**
55/22 • • for transmissions with crossing shafts, especially worms, worm-gears (bevel gears, crown wheels, helical gears F16H 55/17) **[1, 2006.01]**
55/24 • • • Special devices for taking up backlash **[1, 2006.01]**
55/26 • • Racks **[1, 2006.01]**
55/28 • • • Special devices for taking up backlash **[1, 2006.01]**
55/30 • • Chain wheels (specially adapted for cycles B62M) **[1, 2006.01]**
55/32 • Friction members (friction surfaces F16D 69/00) **[1, 2006.01]**
55/34 • • Non-adjustable friction discs **[1, 2006.01]**
55/36 • • Pulleys (with features essential for adjustment F16H 55/52) **[1, 2006.01]**
55/38 • • • Means or measures for increasing adhesion (in general F16D 69/00) **[1, 2006.01]**
55/40 • • • with spokes (F16H 55/48 takes precedence) **[1, 2006.01]**
55/42 • • • Laminated pulleys **[1, 2006.01]**
55/44 • • • Sheet-metal pulleys **[1, 2006.01]**
55/46 • • • Split pulleys **[1, 2006.01]**
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) **[1, 2006.01]**
55/49 • • • Features essential to V-belt pulleys **[2, 2006.01]**
55/50 • • • Features essential to rope pulleys **[1, 2006.01]**
55/52 • • Pulleys or friction discs of adjustable construction **[1, 2006.01]**
55/54 • • • of which the bearing parts are radially adjustable **[1, 2006.01]**
55/56 • • • of which the bearing parts are relatively axially adjustable **[1, 2006.01]**

57/00 General details of gearing (of screw-and-nut gearing F16H 25/00; of fluid gearing F16H 39/00-F16H 43/00) **[1, 2006.01, 2012.01]**
57/01 • Monitoring wear or stress of gearing elements, e.g. for triggering maintenance **[2012.01]**
57/02 • Gearboxes; Mounting gearing therein **[1, 2006.01, 2012.01]**

Note(s) [2012.01]

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

57/021 • • Shaft support structures, e.g. partition walls, bearing eyes, casing walls or covers with bearings **[2012.01]**
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) **[2012.01]**
57/023 • • Mounting or installation of gears or shafts in gearboxes, e.g. methods or means for assembly **[2012.01]**
57/025 • • Support of gearboxes, e.g. torque arms, or attachment to other devices (mounting of transmissions in vehicles B60K 17/00) **[2012.01]**
57/027 • • characterised by means for venting gearboxes, e.g. air breathers **[2012.01]**
57/028 • • characterised by means for reducing vibration or noise **[2012.01]**
57/029 • • characterised by means for sealing gearboxes, e.g. to improve airtightness **[2012.01]**
57/03 • • characterised by means for reinforcing gearboxes, e.g. ribs **[2012.01]**
57/031 • • characterised by covers or lids for gearboxes **[2012.01]**
57/032 • • characterised by the materials used **[2012.01]**
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 **[2012.01]**
57/035 • • Gearboxes for gearing with endless flexible members **[2012.01]**
57/037 • • Gearboxes for accommodating differential gearing (rotating cases for differential gearings F16H 48/40) **[2012.01]**
57/038 • • Gearboxes for accommodating bevel gears (F16H 57/037 takes precedence) **[2012.01]**
57/039 • • Gearboxes for accommodating worm gears **[2012.01]**
57/04 • Features relating to lubrication or cooling (control of lubrication or cooling in hydrostatic gearing F16H 61/4165) **[1, 2006.01, 2010.01]**
57/05 • • of chains (for conveyors B65G 45/08) **[1, 2006.01]**
57/08 • of gearings with members having orbital motion **[1, 2006.01]**
57/10 • • Braking arrangements **[1, 2006.01]**
57/12 • Arrangements for adjusting or for taking-up backlash not provided for elsewhere **[2, 2006.01]**

Control of gearing conveying rotary motion [5]

Note(s) [5, 2006.01]

1. Attention is drawn to the Notes following the title of subclass B60W.
2. In groups F16H 59/00-F16H 63/00, clutches positioned within a gearbox are considered as comprising part of the gearings.
3. In groups F16H 59/00-F16H 63/00, the following terms or expressions are used with the meaning indicated:
   - "final output element" means the final element which is moved to establish a gear ratio, i.e. which achieves the linking between two power transmission means, e.g. reverse idler gear, gear cluster, coupling sleeve, apply piston of a hydraulic clutch;
   - "mechanism" means a kinematic chain consisting either of a single element or alternatively of a series of elements, the position of each point on the kinematic chain being derivable from the position of any other point on the chain, and therefore, for a given position of a point on one of the elements forming the kinematic chain there is only one position for each of the other points on the element or series of elements forming the kinematic chain;
   - "final output mechanism" means the mechanism which includes the final output element;
   - "actuating mechanism" means the mechanism, the movement of which causes the movement of another mechanism by being in mutual contact;
   - "final actuating mechanism" means the mechanism actuating the final output mechanism.
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 classification according to Notes (4) and (5), 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 change-speed- or reversing-gearings for conveying rotary motion [5, 2006.01]

59/02 • Selector apparatus **[5, 2006.01]**
59/04 • • Ratio selector apparatus **[5, 2006.01]**
59/06 • • • the ratio being infinitely variable **[5, 2006.01]**
59/08 • • Range selector apparatus **[5, 2006.01]**
59/10 • • • comprising levers **[5, 2006.01]**
59/12 • • • comprising push button devices **[5, 2006.01]**
59/14 • Inputs being a function of torque or torque demand **[5, 2006.01]**
59/16 • • Dynamometric measurement of torque **[5, 2006.01]**
59/18 • • dependent on the position of the accelerator pedal **[5, 2006.01]**
59/20 • • • Kickdown **[5, 2006.01]**
59/22 • • • Idle position **[5, 2006.01]**
59/24 • • dependent on the throttle opening **[5, 2006.01]**
59/26 • • dependent on pressure **[5, 2006.01]**
59/28 • • • Gasifier pressure in gas turbines **[5, 2006.01]**
59/30 • • • Intake manifold vacuum **[5, 2006.01]**
59/32 • • • Supercharger pressure in internal combustion engines **[5, 2006.01]**
59/34 • • dependent on fuel feed **[5, 2006.01]**
59/36 • Inputs being a function of speed **[5, 2006.01]**
59/38 • • of gearing elements **[5, 2006.01]**
59/40 • • • Output shaft speed **[5, 2006.01]**
59/42 • • • Input shaft speed **[5, 2006.01]**
59/44 • • dependent on machine speed (F16H 59/46 takes precedence) **[5, 2006.01]**
59/46 • • dependent on a comparison between speeds **[5, 2006.01]**
59/48 • Inputs being a function of acceleration **[5, 2006.01]**
59/50 • Inputs being a function of the status of the machine, e.g. position of doors or safety belts **[5, 2006.01]**
59/52 • • dependent on the weight of the machine, e.g. change in weight resulting from passengers boarding a bus **[5, 2006.01]**
59/54 • • dependent on signals from the brakes, e.g. parking brakes **[5, 2006.01]**
59/56 • • dependent on signals from the main clutch **[5, 2006.01]**
59/58 • • dependent on signals from the steering **[5, 2006.01]**
59/60 • Inputs being a function of ambient conditions **[5, 2006.01]**
59/62 • • Atmospheric pressure **[5, 2006.01]**
59/64 • • Atmospheric temperature **[5, 2006.01]**
59/66 • • Road conditions, e.g. slope, slippery **[5, 2006.01]**
59/68 • Inputs being a function of gearing status **[5, 2006.01]**
59/70 • • dependent on the ratio established **[5, 2006.01]**
59/72 • • dependent on oil characteristics, e.g. temperature, viscosity **[5, 2006.01]**
59/74 • Inputs being a function of engine parameters (F16H 59/14 takes precedence) **[5, 2006.01]**
59/76 • • Number of cylinders operating **[5, 2006.01]**
59/78 • • Temperature **[5, 2006.01]**

61/00 Control functions within change-speed- or reversing-gearings for conveying rotary motion [5, 2006.01]

61/02 • characterised by the signals used **[5, 2006.01]**
61/04 • Smoothing ratio shift **[5, 2006.01]**
61/06 • • by controlling rate of change of fluid pressure **[5, 2006.01]**
61/08 • • Timing control **[5, 2006.01]**
61/10 • Regulating shift hysteresis **[5, 2006.01]**
61/12 • Detecting malfunction or potential malfunction, e.g. fail safe (in control of hydrostatic gearing F16H 61/4192) **[5, 2006.01, 2010.01]**
61/14 • Control of torque converter lock-up clutches **[5, 2006.01]**
61/16 • Inhibiting shift during unfavourable conditions (F16H 61/18 takes precedence) **[5, 2006.01]**
61/18 • Preventing unintentional or unsafe shift (constructional features of the final output mechanisms F16H 63/30) **[5, 2006.01]**
61/20 • Preventing gear creeping **[5, 2006.01]**
61/21 • Providing engine brake control **[7, 2006.01]**

61/22 • Locking (F16H 63/34 takes precedence) **[5, 2006.01]**
61/24 • Providing feel, e.g. to enable selection **[5, 2006.01]**
61/26 • Generation or transmission of movements for final actuating mechanisms **[5, 2006.01]**

Note(s) [5]

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 **[5, 2006.01]**
61/30 • • • Hydraulic motors therefor **[5, 2006.01]**
61/32 • • • Electric motors therefor **[5, 2006.01]**
61/34 • • comprising two mechanisms, one for the preselection movement, and one for the shifting movement (F16H 61/36 takes precedence) **[5, 2006.01]**
61/36 • • with at least one movement being transmitted by a cable **[5, 2006.01]**
61/38 • Control of exclusively fluid gearing **[5, 2006.01]**
61/40 • • hydrostatic (involving modification of the gearing F16H 39/02, F16H 39/04) **[5, 2006.01, 2010.01]**
61/4008 • • • Control of circuit pressure **[2010.01]**
61/4017 • • • • Control of high pressure, e.g. avoiding excess pressure by a relief valve **[2010.01]**
61/4026 • • • • Control of low pressure **[2010.01]**
61/4035 • • • Control of circuit flow **[2010.01]**
61/4043 • • • Control of a bypass valve **[2010.01]**
61/4052 • • • • by using a variable restriction, e.g. an orifice valve **[2010.01]**
61/4061 • • • Control related to directional control valves, e.g. change-over valves, for crossing the feeding conduits (forward reverse switching by using swash plate F16H 61/438) **[2010.01]**
61/4069 • • • Valves related to the control of neutral, e.g. shut off valves (zero tilt rotation holding means F16H 61/439) **[2010.01]**
61/4078 • • • Fluid exchange between hydrostatic circuits and external sources or consumers **[2010.01]**
61/4096 • • • • with pressure accumulators **[2010.01]**
61/4104 • • • • Flushing, e.g. by using flushing valves or by connection to exhaust **[2010.01]**
61/4131 • • • • Fluid exchange by aspiration from reservoirs, e.g. sump **[2010.01]**
61/4139 • • • • Replenishing or scavenging pumps, e.g. auxiliary charge pumps **[2010.01]**
61/4148 • • • Open loop circuits **[2010.01]**
61/4157 • • • Control of braking, e.g. preventing pump over-speeding when motor acts as a pump **[2010.01]**
61/4165 • • • Control of cooling or lubricating **[2010.01]**
61/4174 • • • Control of venting, e.g. removing trapped air **[2010.01]**
61/4183 • • • Preventing or reducing vibrations or noise, e.g. avoiding cavitations **[2010.01]**
61/4192 • • • Detecting malfunction or potential malfunction, e.g. fail safe **[2010.01]**
61/42 • • • involving adjustment of a pump or motor with adjustable output or capacity **[5, 2006.01, 2010.01]**
61/421 • • • • Motor capacity control by electro-hydraulic control means, e.g. using solenoid valves **[2010.01]**
61/423 • • • • Motor capacity control by fluid pressure control means **[2010.01]**
61/425 • • • • Motor capacity control by electric actuators **[2010.01]**
61/427 • • • • Motor capacity control by mechanical control means, e.g. by levers or pedals **[2010.01]**
61/431 • • • • Pump capacity control by electro-hydraulic control means, e.g. using solenoid valve **[2010.01]**
61/433 • • • • Pump capacity control by fluid pressure control means **[2010.01]**
61/435 • • • • Pump capacity control by electric actuators **[2010.01]**
61/437 • • • • Pump capacity control by mechanical control means, e.g. by levers or pedals **[2010.01]**
61/438 • • • • Control of forward-reverse switching, e.g. control of the swash plate causing discharge in two directions (using a directional control valve F16H 61/4061) **[2010.01]**
61/439 • • • • Control of the neutral position, e.g. by zero tilt rotation holding means (using a neutral valve or a shutoff valve F16H 61/4069) **[2010.01]**
61/44 • • • with more than one pump or motor unit in operation **[5, 2006.01]**
61/444 • • • • by changing the number of pump or motor units in operation **[2010.01]**
61/448 • • • • Control circuits for tandem pumps or motors **[2010.01]**
61/452 • • • • Selectively controlling multiple pumps or motors, e.g. switching between series or parallel **[2010.01]**
61/456 • • • • Control of the balance of torque or speed between pumps or motors (hydrostatic differentials F16H 48/18) **[2010.01]**
61/46 • • • Automatic regulation in accordance with output requirements **[5, 2006.01, 2010.01]**
61/462 • • • • for achieving a target speed ratio **[2010.01]**
61/465 • • • • for achieving a target input speed **[2010.01]**
61/468 • • • • for achieving a target input torque **[2010.01]**
61/47 • • • • for achieving a target output speed **[2010.01]**
61/472 • • • • for achieving a target output torque **[2010.01]**
61/475 • • • • for achieving a target power, e.g. input power or output power **[2010.01]**
61/478 • • • • for preventing overload, e.g. high pressure limitation **[2010.01]**
61/48 • • hydrodynamic **[5, 2006.01]**
61/50 • • • controlled by changing the flow, force, or reaction of the liquid in the working circuit, while maintaining a completely filled working circuit **[5, 2006.01]**
61/52 • • • • by altering the position of blades **[5, 2006.01]**
61/54 • • • • • by means of axially-shiftable blade runners **[5, 2006.01]**
61/56 • • • • • to change the blade angle **[5, 2006.01]**
61/58 • • • • by change of the mechanical connection of, or between, the runners **[5, 2006.01]**
61/60 • • • • • exclusively by the use of freewheel clutches **[5, 2006.01]**

61/62 • • • • • involving use of a speed-changing gearing or of a clutch in the connection between runners (F16H 45/02, F16H 61/60 take precedence) **[5, 2006.01]**

61/64 • • • controlled by changing the amount of liquid in the working circuit **[5, 2006.01]**

61/66 • specially adapted for continuously variable gearings (F16H 61/38 takes precedence; orbital toothed gearings with a secondary drive in order to vary the speed continuously F16H 3/72) **[2006.01]**

61/662 • • with endless flexible members **[2006.01]**

61/664 • • Friction gearings **[2006.01]**

61/68 • specially adapted for stepped gearings **[2006.01]**

61/682 • • with interruption of drive **[2006.01]**

61/684 • • without interruption of drive **[2006.01]**

61/686 • • • with orbital gears **[2006.01]**

61/688 • • • with two inputs, e.g. selection of one of two torque-flow paths by clutches **[2006.01]**

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 **[2006.01]**

63/00 Control outputs to change-speed- or reversing-gearings for conveying rotary motion [5, 2006.01]

63/02 • Final output mechanisms therefor; Actuating means for the final output mechanisms **[5, 2006.01]**

63/04 • • a single final output mechanism being moved by a single final actuating mechanism **[5, 2006.01]**

63/06 • • • the final output mechanism having an indefinite number of positions **[5, 2006.01]**

63/08 • • Multiple final output mechanisms being moved by a single common final actuating mechanism **[5, 2006.01]**

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 **[5, 2006.01]**

63/12 • • • • two or more ways of movement occurring simultaneously **[5, 2006.01]**

63/14 • • • the final output mechanisms being successively actuated by repeated movement of the final actuating mechanism **[5, 2006.01]**

63/16 • • • the final output mechanisms being successively actuated by progressive movement of the final actuating mechanism **[5, 2006.01]**

63/18 • • • • the final actuating mechanism comprising cams **[5, 2006.01]**

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 **[5, 2006.01]**

63/22 • • • • the final output mechanisms being simultaneously moved by the final actuating mechanism **[5, 2006.01]**

63/24 • • each of the final output mechanisms being moved by only one of the various final actuating mechanisms **[5, 2006.01]**

63/26 • • • some of the movements of the final output mechanisms being caused by another final output mechanism **[5, 2006.01]**

63/28 • • two or more final actuating mechanisms moving the same final output mechanism **[5, 2006.01]**

63/30 • • Constructional features of the final output mechanisms **[5, 2006.01]**

63/32 • • • Gear shifter yokes **[5, 2006.01]**

63/34 • • • Locking or disabling mechanisms **[5, 2006.01]**

63/36 • • • • Interlocking devices **[5, 2006.01]**

63/38 • • • Detents **[5, 2006.01]**

63/40 • comprising signals other than signals for actuating the final output mechanisms **[5, 2006.01]**

63/42 • • Ratio indicator devices **[5, 2006.01]**

63/44 • • Signals to the control unit of auxiliary gearing **[5, 2006.01]**

63/46 • • Signals to a clutch outside the gearbox **[5, 2006.01]**

63/48 • • Signals to a parking brake **[5, 2006.01]**

63/50 • • Signals to an engine or motor **[7, 2006.01]**