COOPERATIVE PATENT CLASSIFICATION

MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING

ENGINEERING IN GENERAL

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

F16D  COUPLINGS FOR TRANSMITTING ROTATION; CLUTCHES; BRAKES

NOTE

Attention is drawn to the following places:

A01D 69/08, A01D 69/10  Clutches or brakes of harvesting machines for grass or cereals;
A61C 1/18  Clutches in dental machines for boring or cutting;
B21B 35/14  Drive couplings for metal-rolling mills;
B30B 15/10  Brakes specially adapted for presses;
B30B 15/12  Clutches specially adapted for presses;
B41J 33/52  Braking devices for ribbon-feed devices in selective printing mechanisms;
B60K 17/00  Arrangement or location of clutches in vehicles;
B61H  Brakes peculiar to rail vehicles;
B62B 5/04  Braking mechanisms for hand carts;
B62B 9/08  Braking mechanisms for children's carriages or perambulators;
B62C 7/00  Braking mechanisms for animal-drawn vehicles;
B62L  Cycle brakes;
B66D 5/00  Braking devices for lifting or hoisting gear;
E21B 17/02  Couplings for drilling rods;
H02P 3/04  Brakes for electric motors, generators, dynamo-electric converters;
H04L 13/04  Clutches for apparatus for transmission of coded digital information.

WARNINGS

1. The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:

   F16D 3/19  covered by F16D 3/50;
   F16D 3/27  covered by F16D 3/265;
   F16D 27/07  covered by F16D 27/06, F16D 27/14;
   F16D 48/12  covered by B60K 23/0808.

2. 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.

Couplings (for transmitting mechanical rotation) (fluid couplings F16D 31/00 - F16D 39/00; couplings or joints specially adapted for deep-drilling rods or sucker rods F16B; for transmitting motion through a wall without relatively-moving surfaces F16J 15/50)

F16D 1/00  Couplings for rigidly connecting two coaxial shafts or other movable machine elements (attachment of wheels to axles for railway carriages B60B; for attachment of cranks to their shafts F16C 3/10)

1/00  1/06  . for attachment of a member on a shaft or on a shaft-end (attachment of marine propellers on shafts B63H 23/34)
1/02  2001/062  . [characterised by adaptors where hub bores being larger than the shaft]
1/027  1/064  . non-disconnectable
1/027  1/068  . involving gluing, welding or the like
1/033  1/072  . involving plastic deformation (plastic welding F16D 1/068)
1/04  1/076  . by clamping together two faces perpendicular to the axis of rotation, e.g. with bolted flanges
1/05  1/08  . with clamping hub; with hub and longitudinal key
1/0805  1/0805  . [with radial clamping due to deformation of a resilient body or a body of fluid (F16D 1/091 takes precedence; elastic couplings F16D 3/80; fluid pressure clutches F16D 25/04)]
1/0811  1/0811  . [with radial clamping due to tilting of a hub part or ring about a diametral axis]
Couplings for transmitting mechanical rotation

1/0817 . . . [with radial clamping due to rotation along an eccentric surface, e.g. arcuate wedging elements (similar clutches F16D 1/096; similar free-wheel clutches F16D 41/06)]

1/0823 . . . [with radial clamping of a helical wrap spring on the shaft or in the hub bore (similar clutches F16D 13/025, F16D 13/08, F16D 27/025, F16D 27/105; similar slip couplings F16D 7/022; similar free-wheel clutches F16D 41/06)]

1/0829 . . . [with radial loading of both hub and shaft by an intermediate ring or sleeve (F16D 1/0817, F16D 1/0823, F16D 1/092 take precedence)]

1/0835 . . . [due to the elasticity of the ring or sleeve]

1/0841 . . . [due to axial loading of the ring or sleeve, e.g. Belleville washers]

1/0847 . . . [with radial clamping due to a radial screw]

1/0852 . . . [with radial clamping between the mating surfaces of the hub and shaft (F16D 1/0805 - F16D 1/0817, F16D 1/09 take precedence)]

1/0858 . . . [due to the elasticity of the hub (including shrink fits)]

1/0864 . . . [due to tangential loading of the hub, e.g. a split hub]

1/087 . . . [due to other loading elements in the hub or shaft]

1/0876 . . . [with axial keys and no other radial clamping]

1/0882 . . . [the key being axially tapered and tightening when loaded axially]

1/0888 . . . [the key having two axially tapered interengaging parts]

1/0894 . . . [with other than axial keys, e.g. diametral pins, cotter pins and no other radial clamping]

1/09 . . . [with radial clamping due to axial loading of at least one pair of conical surfaces (tapered keys F16D 1/0882)]

2001/0903 . . . [the clamped shaft being hollow]

2001/0906 . . . [using a hydraulic fluid to clamp or disconnect, not provided for in F16D 1/091]

1/091 . . . [and comprising a chamber including a tapered piston moved axially by fluid pressure to effect clamping]

1/092 . . . [the pair of conical mating surfaces being provided on the coupled hub and shaft]

1/093 . . . [using one or more elastic segmented conical rings forming at least one of the conical surfaces, the rings being expanded or contracted to effect clamping (F16D 1/091 takes precedence)]

1/094 . . . [using one or more pairs of elastic or segmented rings with mutually mating conical surfaces, one of the mating rings being contracted and the other being expanded]

2001/0945 . . . [using multiple pairs of elastic or segmented rings to effect clamping]

1/095 . . . [with clamping effected by ring contraction only ((for connecting two abutting shafts F16D 1/02)]

2001/0955 . . . [the clamping is effected by hub contraction, i.e. a compression of the hub instead of the ring]

1/096 . . . [the ring or rings being located between the shaft and the hub]

1/097 . . . . . . with clamping effected by ring expansion only, e.g. with an expanded ring located between hub and shaft

1/10 . . . Quick-acting couplings in which the parts are connected by simply bringing them together axially

1/101 . . . [without axial retaining means rotating with the coupling]

2001/102 . . . [the torque is transmitted via polygon shaped connections]

2001/103 . . . [the torque is transmitted via splined connections]

1/104 . . . [having retaining means rotating with the coupling and acting only by friction]

1/108 . . . [having retaining means rotating with the coupling and acting by interengaging parts, i.e. positive coupling]

1/112 . . . [the interengaging parts comprising torque-transmitting surfaces, e.g. bayonet joints]

1/116 . . . [the interengaging parts including a continuous or interrupted circumferential groove in the surface of one of the coupling parts (circulars for retaining hubs on shafts F16B 21/18)]

1/12 . . . allowing adjustment of the parts about the axis (during motion F16D 3/10)

3/00 Yielding couplings, i.e. with means permitting movement between the connected parts during the drive (couplings disconnectable simply by axial movement F16D 1/10; slip couplings F16D 7/00)

3/005 . . . [incorporating leaf springs, flexible parts of reduced thickness or the like acting as pivots]

3/02 . . . [adapted to specific functions (universal joints, see the appropriate groups)]

3/04 . . . [specially adapted to allow radial displacement, e.g. Oldham couplings]

3/06 . . . [specially adapted to allow axial displacement]

3/065 . . . . . . [by means of rolling elements]

3/08 . . . [Couplings for intersecting shafts, provided with intermediate bars bent in an angle corresponding with the angle of intersection]

3/10 . . . [Couplings with means for varying the angular relationship of two coaxial shafts during motion]

3/12 . . . [specially adapted for accumulation of energy to absorb shocks or vibration (by making use of fluid elements F16D 3/80)]

3/14 . . . [combined with a friction coupling for damping vibration or absorbing shock]

3/16 . . . [Universal joints in which flexibility is produced by means of pivots or sliding or rolling connecting parts]

3/18 . . . [the coupling parts (1) having slidably-interengaging teeth]

3/185 . . . [radial teeth connecting concentric inner and outer coupling parts]

3/20 . . . [one coupling part entering a sleeve of the other coupling part and connected thereto by sliding or rolling members (F16D 3/18, F16D 3/24 take precedence)]

**NOTE**

“Coupling parts” means the driving member and the driven member of the coupling to be mounted on and rotate as a unit with the shafts or their equivalents between which the coupling is placed. An intermediate member
Couplings for transmitting mechanical rotation

F16D 3/20
(continued)
interconnecting these parts is regarded as such an equivalent.

3/202 . . . one coupling part having radially projecting pins, e.g. tripod joints

2003/2023 . . . . \{with linear rolling bearings between raceway and trunnion mounted shoes\}

2003/2026 . . . . \{with trunnion rings, i.e. with tripod joints having rollers supported by a ring on the trunnion\}

3/205 . . . . the pins extending radially outwardly from the coupling part

3/2052 . . . . \{having two pins\}

3/2055 . . . . \{having three pins, i.e. true tripod joints\}

3/2057 . . . . \{having four or more pins, e.g. with compensation for relative pin movement\}

3/207 . . . . the pins extending radially inwardly from the coupling part

3/22 . . . the rolling members being balls, rollers, or the like, guided in grooves or sockets in both coupling parts

3/221 . . . the rolling members being located in sockets in one of the coupling parts

3/223 . . . the rolling members being guided in grooves in both coupling parts

3/203/22303 . . . . \{Details of ball cages\}

3/203/22306 . . . . \{having counter tracks, i.e. ball track surfaces which diverge in opposite directions\}

3/203/22309 . . . . \{Details of grooves\}

3/203/22313 . . . . \{Details of the inner part of the core or means for attachment of the core on the shaft\}

3/203/22316 . . . . \{Means for fastening or attaching the bellows or gaiters\}

3/203/2232 . . . . \{Elements arranged in the hollow space between the end of the inner shaft and the outer joint member\}

3/203/22323 . . . . \{Attachments to the shaft of the inner joint member whereby the attachments are distanced from the core\}

3/203/22326 . . . . \{Attachments to the outer joint member, i.e. attachments to the exterior of the outer joint member or to the shaft of the outer joint member\}

3/223 . . . . . where the track is made up of two curves with a point of inflexion in between, i.e. S-track joints

3/2237 . . . . . where the grooves are composed of radii and adjoining straight lines, i.e. undercut free [UF] type joints

3/224 . . . . . the groove centre-lines in each coupling part lying on a sphere

3/2245 . . . . . where the groove centres are offset from the joint centre

3/226 . . . . . the groove centre-lines in each coupling part lying on a cylinder co-axial with the respective coupling part

3/2265 . . . . . \{the joints being non-telescopic\}

3/227 . . . . . the joints being telescopic

3/229 . . . . . Prismatic coupling parts having each groove centre-line lying on planes parallel to the axis of the respective coupling part \(F16D 3/224, F16D 3/226\) take precedence

3/24 . . . . . comprising balls, rollers, or the like between overlapping driving faces, e.g. cogs, on both coupling parts

3/26 . . . . . Hooke’s joints or other joints with an equivalent intermediate member to which each coupling part is pivotally or slidably connected \(F16D 3/18, F16D 3/20\) take precedence

3/265 . . . . \{in which one coupling part has a tongue received with the intermediate member(s) in a recess with a transverse axis in the other coupling part\}

3/28 . . . . . in which the interconnecting pivots include elastic members

3/30 . . . . . in which the coupling is specially adapted to constant velocity-ratio

3/32 . . . . . \{by the provision of two intermediate members each having two relatively perpendicular trunnions or bearings\}

3/33 . . . . . with ball or roller bearings

3/34 . . . . . \{parts being connected by ridges, pins, balls, or the like guided in grooves or between cogs\}

3/36 . . . . . in which each pivot between the coupling parts and the intermediate member comprises a single ball

3/38 . . . . . \{with a single intermediate member with trunnions or bearings arranged on two axes perpendicular to one another \(F16D 3/36\) takes precedence\}

3/382 . . . . \{constructional details of other than the intermediate member\}

3/385 . . . . \{Bearing cup; Bearing construction; Bearing seal; Mounting of bearing on the intermediate member \(mounting of bearing in fork F16D 3/382\)\}

3/387 . . . . \{Fork construction; Mounting of fork on shaft; Adapting shaft for mounting of fork\}

3/40 . . . . . with intermediate member provided with two pairs of outwardly-directed trunnions on intersecting axes

3/405 . . . . \{Apparatus for assembling or dismantling\}

3/41 . . . . . \{with ball or roller bearings\}

3/42 . . . . . \{with ring-shaped intermediate member provided with bearings or inwardly-directed trunnions\}

3/43 . . . . \{with ball or roller bearings\}

3/44 . . . . \{the intermediate member being connected to the coupling parts by ridges, pins, balls, or the like guided in grooves or between cogs\}

3/46 . . . . \{each coupling part embracing grooves or ridges on the intermediate member\}

3/48 . . . . \{one coupling part having pins arranged parallel to the axis and entering holes in the other coupling part\}

3/50 . . . . \{with the coupling parts connected by one or more intermediate members \(F16D 3/16\) takes precedence\}

3/52 . . . \{comprising a continuous strip, spring, or the like engaging the coupling parts at a number of places\}

3/54 . . \{Couplings comprising a chain or strip surrounding two wheels arranged side by side and provided with teeth or the equivalent\}
Couplings for transmitting mechanical rotation

3/56 . . . comprising elastic metal lamellae, elastic rods, or the like, e.g. arranged radially or parallel to the axis, the members being shear-loaded collectively by the total load

3/58 . . . the intermediate members being made of rubber or like material

3/60 . . . comprising pushing or pulling links attached to both parts (F16D 3/64 takes precedence)

3/62 . . . the links or their attachments being elastic

3/64 . . . comprising elastic elements arranged between substantially-radial walls of both coupling parts

3/66 . . . the elements being metallic, e.g. in the form of coils

3/68 . . . the elements being made of rubber or similar material

3/70 . . . comprising elastic elements arranged in holes in one coupling part and surrounding pins on the other coupling part

3/72 . . . with axially-spaced attachments to the coupling parts (F16D 3/72 takes precedence)

3/725 . . . [with an intermediate member made of fibre-reinforced material (made of rubber-like material F16D 3/74; shafts made of fibre-reinforced resin F16C 3/026)]

3/74 . . . the intermediate member or members being made of rubber or other [rubber-like] flexible material

2003/745 . . . [Tyre type coupling, i.e. bellows with only one fold]

3/76 . . . shaped as an elastic ring centered on the axis, surrounding a portion of one coupling part and surrounded by a sleeve of the other coupling part

3/77 . . . the ring being metallic

3/78 . . . shaped as an elastic disc or flat ring, arranged perpendicular to the axis of the coupling parts, different sets of spots of the disc or ring being attached to each coupling part, e.g. Hardy couplings

3/79 . . . the disc or ring being metallic

3/80 . . . in which a fluid is used (fluid couplings allowing continuous slip F16D 3/80 - F16D 35/00)

3/82 . . . with a coupling element in the form of a pneumatic tube (similar clutches F16D 25/04)

3/84 . . . Shrouds, e.g. casings, covers; Sealing means specially adapted therefor

3/841 . . . [Open covers, e.g. guards for agricultural p.t.o. shafts]

3/843 . . . [enclosed covers]

3/845 . . . [allowing relative movement of joint parts due to the flexing of the cover]

3/848 . . . [allowing relative movement of joint parts due to sliding between parts of the cover]

2003/846 . . . [Venting arrangements for flexible seals, e.g. ventilation holes]

5/00 Impulse couplings, i.e. couplings that alternately accelerate and decelerate the driven member

7/00 Slip couplings, e.g. slipping on overload, for absorbing shock (combined with yielding shaft couplings F16D 3/14; fluid slip couplings F16D 3/100 - F16D 35/00)

7/002 . . . [the torque being transmitted and limited by yielding of an elastomeric race]

7/005 . . . [the torque being transmitted and limited by rolling friction, e.g. ball bearings axially loaded]

7/007 . . . [the torque being transmitted and limited by rolling surfaces skidding, e.g. skew needle rollers]

7/02 . . . of the friction type (couplings in which overload initiates a decrease of coupling pressure or a disconnection, see the relevant groups for clutches [. . . for friction overload clutches F16D 43/21])

7/021 . . . [with radially applied torque-limiting friction surfaces (F16D 7/022 takes precedence)]

7/022 . . . [with a helical band or equivalent member cooperating with a cylindrical torque limiting coupling surface]

7/024 . . . [with axially applied torque limiting friction surfaces]

7/025 . . . [with flat clamping surfaces, e.g. discs]

7/027 . . . . . . [with multiple lamellae]

7/028 . . . [with conical friction surfaces]

7/04 . . . of the ratchet type (similar gearings based on repeated accumulation and delivery of inertia energy F16H 33/08; overload clutches of the ratchet type F16D 43/20)]

7/042 . . . [with at least one part moving axially between engagement and disengagement (F16D 7/08 takes precedence)]

7/044 . . . [the axially moving part being coaxial with the rotation, e.g. a gear with face teeth]

7/046 . . . [with a plurality of axially moving parts]

7/048 . . . [with parts moving radially between engagement and disengagement (F16D 7/10 takes precedence)]

7/06 . . . with intermediate balls or rollers

7/08 . . . moving axially between engagement and disengagement

7/10 . . . moving radially between engagement and disengagement

9/00 Couplings with safety member for disconnecting, e.g. breaking or melting member

9/02 . . . by thermal means, e.g. melting member

9/04 . . . by tensile breaking

9/06 . . . by breaking due to shear stress

9/08 . . . over a single area encircling the axis of rotation, e.g. shear necks on shafts (F16D 9/10 takes precedence)

9/10 . . . having a part movable after disconnection so as to provide reconnection, e.g. advanceable shear pins

Clutches with mechanically-actuated clutching members

(automatic clutches F16D 41/00 - F16D 45/00)

11/00 Clutches in which the members have interengaging parts (arrangements for synchronisation F16D 23/02)

2011/002 . . . [using an external and axially slidable sleeve for coupling the teeth of both coupling components together]

2011/004 . . . [using an internal or intermediate axially slidable sleeve, coupling both components together, whereby the intermediate sleeve is arranged internally at least with respect to one of the components]

2011/006 . . . [Locking or detent means, i.e. means to keep the clutch in engaged condition]

2011/008 . . . [characterised by the form of the teeth forming the inter-engaging parts; Details of shape or structure of these teeth]
Clutches with mechanically-actuated clutching members

- Clutches with a helical band or equivalent member with two or more turns embracing a drum or the like (electromagnetically actuated F16D 27/105)
- With means for actuating or keeping engaged by a force derived at least partially from one of the shafts to be connected (automatic clutches F16D 43/00)
- With clutching members movable otherwise than only axially (F16D 13/08, F16D 13/12 take precedence)
- With a helical band or equivalent member, which may be built up from linked parts, with more than one turn embracing a drum or the like, with or without an additional clutch actuating the end of the band (F16D 13/02 takes precedence; similar slip couplings F16D 7/022; similar clutches electromagnetically actuated F16D 27/025, F16D 27/105; similar free-wheel clutches F16D 41/20; similar brakes F16D 49/02)
- With clutching members co-operating with the periphery of a drum, a wheel-rim, or the like (F16D 13/02 - F16D 13/08 take precedence; similar brakes F16D 49/00)
- With an expandable band or coil co-operating with the inner surface of a drum or the like (F16D 13/02 takes precedence; similar brakes F16D 51/02)
- With outwardly-movable clutching members co-operating with the inner surface of a drum or the like (F16D 13/02, F16D 13/06, F16D 13/12 take precedence; similar brakes F16D 51/00)
- Shaped as radially-movable segments
- Shaped as linked or separately-pivoted segments
- With clutching members co-operating with both the periphery and the inner surface of a drum or wheel-rim (similar brakes F16D 53/00)
- With axially-movable clutching members (similar brakes F16D 55/00)
- With conical friction surfaces (cone clutches)
- In which the or each axially-movable member is pressed exclusively against an axially-located member
- With means for increasing the effective force between the actuating sleeve or equivalent member and the pressure member
- In which the clutching pressure is produced by springs only

- In which two or more axially-movable members are pressed from one side towards an axially-located member
- With means for increasing the effective force between the actuating sleeve or equivalent member and the pressure member
- In which the clutching pressure is produced by springs only
- In which two axially-movable members, of which one is attached to the driving side and the other to the driven side, are pressed from one side towards an axially-located member
- With means for increasing the effective force between the actuating sleeve or equivalent member and the pressure member
- In which the clutching pressure is produced by springs only
- In which three or more axially-movable members are fixed alternately to the shafts to be coupled and are pressed from one side towards an axially-located member (F16D 13/385 takes precedence)
- With means for increasing the effective force between the actuating sleeve or equivalent member and the pressure member
- In which the clutching pressure is produced by springs only
- In which means for releasing the clutch pressure in case of back torque
- Details ([tools for assembling or disassembling clutches B25B 27/0064])
- Securing means for transportation or shipping
- [Diaphragm-springs, e.g. Belleville (co-operation with a disengaging thrust ring or bearing F16D 23/14)]
- [Arrangements or details relating to the mounting or support of the diaphragm on the clutch on the clutch cover or the pressure plate]
- [the cover housing is formed by diaphragm springs]
- [the diaphragm springs are arranged outside the cover housing]
- Clutching elements (friction lining or attachment thereof F16D 69/00)
- Clutch-bands; Clutch shoes; Clutch-drums (brake-bands, brake-shoes, brake-drums F16D 65/00)
Clutches with mechanically-actuated clutching members

13/64 . . . Clutch-plates; Clutch-lamellae (brake-plates, brake-lamellae F16D 65/12)

2013/642 . . . . [with resilient attachment of frictions rings or linings to their supporting discs or plates for allowing limited axial displacement of these rings or linings]

13/644 . . . . [Hub construction]

13/646 . . . . {Mounting of the discs on the hub}

13/648 . . . . {for clutches with multiple lamellae}

13/66 . . . . of conical shape

13/68 . . . . Attachments of plates or lamellae to their supports {one or more discs connected to the linings transmitting torque to one or more discs connected to the hub by helical springs in windows in the discs, i.e. rotary vibration dampers F16F 15/12)}

13/683 . . . . {for clutches with multiple lamellae}

13/686 . . . . {with one or more intermediate members made of rubber or like material transmitting torque from the linings to the hub}

13/69 . . . . Arrangements for spreading lamellae in the released state

13/70 . . Pressure members, e.g. pressure plates, for clutch-plates or lamellae; Guiding arrangements for pressure members {clutch flywheels comprising two or more masses with a rotational damper F16F 15/12)}

2013/703 . . . . [the pressure plate on the flywheel side is combined with a damper]

2013/706 . . . . [the axially movable pressure plate is supported by leaf springs]

13/71 . . . . in which the clutching pressure is produced by springs only

13/72 . . Features relating to cooling

13/74 . . Features relating to lubrication

13/75 . . Features relating to adjustment, e.g. slack adjusters

13/752 . . . . [the adjusting device being located in the actuating mechanism arranged outside the clutch (adjusting "Bowden" mechanisms F16C 1/22)]

13/755 . . . . [the adjusting device being located in or near the release bearing]

13/757 . . . . [the adjusting device being located on or inside the clutch cover, e.g. acting on the diaphragm or on the pressure plate]

13/76 . . specially adapted to incorporate with other transmission parts, i.e. at least one of the clutch parts also having another function, e.g. being the disc of a pulley

15/00 Clutches with wedging balls or rollers or with other wedgeable separate clutching members (freewheels, freewheel clutches F16D 41/00)

17/00 Clutches in which the drive is transmitted solely by virtue of the eccentricity of the contacting surfaces of clutch members which fit one around the other

19/00 Clutches with mechanically-actuated clutching members not otherwise provided for

21/00 Systems comprising a plurality of actuated clutches (for synchronisation F16D 23/04)

21/02 . . for interconnecting three or more shafts or other transmission members in different ways (in endless-track vehicles B62D)

21/04 . . with a shaft carrying a number of rotatable transmission members, e.g. gears, each of which can be connected to the shaft by a clutching member or members between the shaft and the hub of the transmission member

21/06 . . at least two driving shafts or two driven shafts being concentric

2021/0607 . . . . [Double clutch with torque input plate in-between the two clutches, i.e. having a central input plate]

2021/0615 . . . . [the central input plate is supported by bearings in-between the two clutches]

2021/0623 . . . . [the central input plate having a damper in-between the two clutches]

2021/063 . . . . [Electric arrangements for clutch control]

2021/0638 . . . . [Electrically actuated multiple lamellae clutches]

2021/0646 . . . . [Electrically actuated clutch with two clutch plates]

2021/0653 . . . . [Hydraulic arrangements for clutch control]

2021/0661 . . . . [Hydraulically actuated multiple lamellae clutches]

2021/0669 . . . . [Hydraulically actuated clutches with two clutch plates]

2021/0676 . . . . [Mechanically actuated multiple lamellae clutches]

2021/0684 . . . . [Mechanically actuated clutches with two clutch plates]

2021/0692 . . . . [with two clutches arranged axially without radial overlap]

21/08 . . Serially-arranged clutches interconnecting two shafts only when all the clutches are engaged (F16D 13/08, F16D 13/12 take precedence)

23/00 Details of mechanically-actuated clutches not specific for one distinct type

23/02 . . Arrangements for synchronisation, also for power-operated clutches (shape or mounting of interengaging parts of clutch members to facilitate engagement F16D 11/08)

23/025 . . . . [Synchro rings]

23/04 . . with an additional friction clutch (synchro rings per se F16D 23/025)

23/06 . . . . and a blocking mechanism preventing the engagement of the main clutch prior to synchronisation

23/0606 . . . . [the blocking mechanism comprising an axially-extending shouldered pin passing through a hole in a radial wall]

23/0612 . . . . [the blocking mechanism comprising a radial pin in an axial slot with at least one branch]

2023/0618 . . . . [Details of blocking mechanism comprising a helical spring loaded element, e.g. ball]

2023/0625 . . . . [Details of members being coupled, e.g. gears]

2023/0631 . . . . [Sliding sleeves; Details thereof]

2023/0637 . . . . [Details relating to the hub member on which the sliding is arranged]

2023/0643 . . . . [Synchro friction clutches with flat plates, discs or lamellae]
Clutches with mechanically-actuated clutching members

Fluid-actuated clutches

25/00 . with means for actuating or keeping engaged by a force derived at least partially from one of the shafts to be connected

25/02 . in which the fluid actuates an elastic clutching, [i.e. elastic actuating] member, e.g. a diaphragm or a pneumatic tube (F16D 25/02 takes precedence; coupling using a pneumatic tube F16D 3/82)

25/042 . (the elastic actuating member rotating with the clutch)

25/044 . . . [and causing purely axial movement]

25/046 . . . [and causing purely radial movement]

25/048 . [the elastic actuating member not rotating with a coupling part]

25/06 . in which the fluid actuates a piston incorporated in, [i.e. rotating with] the clutch (F16D 25/02 takes precedence)

25/061 . . the clutch having interengaging clutch members

25/062 . . the clutch having friction surfaces

25/063 . . with clutch members exclusively moving axially

25/0632 . . . with conical friction surfaces, e.g. cone clutches

25/0635 . . . with flat friction surfaces, e.g. discs

25/0638 . . . . with more than two discs, e.g. multiple lamellae

25/064 . . . the friction surface being grooved

25/065 . . . with clutching members having a movement which has at least a radial component

25/08 . with fluid-actuated member not rotating with a clutching member (F16D 25/02 takes precedence [F16D 25/048 takes precedence])

25/082 . . . (the line of action of the fluid-actuated members co-inciding with the axis of rotation)

25/083 . . . . [Actuators therefor (F16D 25/085 - F16D 25/087 take precedence)]

25/085 . . . . [the clutch actuation being of the pull type]

25/086 . . . . [the clutch being actuated by a push rod extending coaxially through the input or output shaft]

25/087 . . . . [the clutch being actuated by the fluid-actuated member via a diaphragm spring or an equivalent array of levers (F16D 25/085; F16D 25/086 take precedence)]

25/088 . . . . [the line of action of the fluid-actuated members being distinctly separate from the axis of rotation]

25/10 . Clutch systems with a plurality of fluid-actuated clutches (arrangements or mounting of clutches in vehicles B60K 17/00)

25/12 . . Details not specific to one of the before-mentioned types

25/123 . . . [in view of cooling and lubrication]

25/126 . . . [adjustment for wear or play]

25/14 . . . [Fluid pressure control]

27/00 Magnetically- [or electrically-] actuated clutches; Control or electric circuits therefor (clutches with magnetisable particles F16D 37/02; [with electrorheological fluids F16D 37/008])

27/0001 . . . [Means for electric connection of the coils of the electromagnetic clutches]

27/0002 . . . [Electric or electronic circuits relating to actuation of electromagnetic clutches]
33/00 Rotary fluid couplings or clutches of the hydrokinetic type

33/02 controlled by changing the flow of the liquid in the working circuit, while maintaining a completely filled working circuit

33/04 . by altering the position of blades

33/06 controlled by changing the amount of liquid in the working circuit

33/08 . by devices incorporated in the fluid coupling, with or without remote control

33/10 . consisting of controllable supply and discharge openings

33/12 . controlled automatically by self-actuated valves

33/14 . consisting of shiftable or adjustable scoops

33/16 . by means arranged externally of the coupling or clutch (mounting of such means in vehicles B60K 23/00, e.g. B60K 23/02)

33/18 . Details (applicable also to fluid gearing F16H 41/24)

33/20 . Shape of wheels, blades, or channels with respect to function

35/00 Fluid clutches in which the clamping is predominantly obtained by fluid adhesion (F16D 37/00 takes precedence; arrangements of viscous clutches in four-wheel drives - B60K 17/3465 and B60K 17/351)

35/005 with multiple lamellae

35/02 with rotary working chambers and rotary reservoirs, e.g. in one coupling part

35/021 . [actuated by valves]

35/022 . . . [the valve being actuated by a bimetallic strip (F16D 35/026 takes precedence)]

35/023 . . [the valve being actuated by a bimetallic coil (F16D 35/026 takes precedence)]

35/024 . . . [the valve being actuated electrically, e.g. by an electromagnet (F16D 35/026 takes precedence)]

35/025 . . . [the valve being actuated by inertia, e.g. using a flyweight or a centrifugal mass (F16D 35/026 takes precedence)]

35/026 . . [actuated by a plurality of valves; the valves being actuated by a combination of mechanisms covered by more than one of groups F16D 35/022 - F16D 35/025]

35/027 . . [actuated by emptying and filling with viscous fluid from outside the coupling during operation]

35/028 . . [actuated electrically, e.g. by an electromagnet (valves actuated electrically F16D 35/024)]

35/029 . . [actuated by varying the volume of the reservoir chamber]

37/00 Clutches in which the drive is transmitted through a medium consisting of small particles, e.g. centrifugally speed-responsive

2037/001 [Electric arrangements for clutch control]

2037/002 [characterised by a single substantially axial gap in which the fluid or medium consisting of small particles is arranged]

2037/004 [characterised by multiple substantially axial gaps in which the fluid or medium consisting of small particles is arranged]
Freewheels or freewheel clutches; Automatic clutches

41/00 Freewheels or freewheel clutches (cycle brakes controlled by back-pedalling B62L 5/00 ; one-way linear clutches F16B 2007/16))
41/02 . . . disengaged by contact of a part of or on the freewheel or freewheel clutch with a stationarily-mounted member
41/04 . . . combined with a clutch for locking the driving and driven members (F16D 41/02, F16D 41/24 take precedence)
41/06 . . . with intermediate wedging coupling members between an inner and an outer surface (F16D 41/02, F16D 41/24 take precedence)
2041/0601 . . . [with a sliding bearing or spacer]
2041/0603 . . . [Sprag details]
2041/0605 . . . [Spring details]
2041/0606 . . . [the intermediate coupling members having parts wedging by movement other than pivoting or rolling but combined with pivoting or rolling parts, e.g. shoes on pivot bars or on rollers]
2041/0608 . . . [Races with a regular polygon shape]
41/061 . . . the intermediate members wedging by movement having an axial component
41/063 . . . the intermediate members wedging by moving along the inner and the outer surface without pivoting or rolling, e.g. sliding wedges (F16D 41/061 takes precedence)
41/064 . . . the intermediate members wedging by rolling and having a circular cross-section, e.g. balls (F16D 41/061 takes precedence)
2041/0643 . . . [the intermediate coupling members being of more than one size]
2041/0646 . . . [the intermediate coupling members moving between recesses in an inner race and recesses in an outer race]
41/066 . . . all members having the same size and only one of the two surfaces being cylindrical
2041/0665 . . . [characterised by there being no cage other than the inner and outer race for distributing the intermediate members]
41/067 . . . and the members being distributed by a separate cage encircling the axis of rotation
41/069 . . . the intermediate members wedging by pivoting or rocking, e.g. sprags (F16D 41/061 takes precedence)
41/07 . . . between two cylindrical surfaces
41/073 . . . [each member comprising at least two elements at different radii]
41/076 . . . [the wedging coupling members being non-releasably joined to form a single annular piece, e.g. either the members being integral projections from the piece, or the piece being an elastic ring cast round the radial centres of the members]
41/08 . . . with provision for altering the freewheeling action
41/082 . . . [the intermediate coupling members wedging by movement other than pivoting or rolling]
41/084 . . . [the intermediate coupling members wedging by pivoting or rocking]
41/086 . . . [the intermediate members being of circular cross-section and wedging by rolling (F16D 41/10 takes precedence)]
41/088 . . . [the intermediate members being of only one size and wedging by a movement not having an axial component, between inner and outer races, one of which is cylindrical]
41/10 . . . with self-actuated reversing
41/105 . . . [the intermediate members being of circular cross-section, of only one size and wedging by rolling movement not having an axial component between inner and outer races, one of which is cylindrical]
41/12 . . . with hinged pawl co-operating with teeth, cogs, or the like (F16D 41/02, F16D 41/24 take precedence)
41/125 . . . [the pawl movement having an axial component]
41/14 . . . the effective stroke of the pawl being adjustable
41/16 . . . the action being reversible
41/18 . . . with non-hinged detent (F16D 41/02, F16D 41/24 take precedence)
41/185 . . . [the engaging movement having an axial component]
41/20 . . . with expandable or contractable clamping ring or band (F16D 41/02, F16D 41/24 take precedence)
41/203 . . . [having coils overlapping in a single radial plane, e.g. Archimedian spiral]
41/206 . . . [having axially adjacent coils, e.g. helical wrapsprings]
41/22 . . . with clutching ring or disc axially shifted as a result of lost motion between actuating members (F16D 41/02, F16D 41/24 take precedence)
41/24 . . . specially adapted for cycles
41/26 . . . with provision for altering the action
41/28 . . . with intermediate wedging coupling members
41/30 . . . with hinged pawl co-operating with teeth, cogs, or the like
41/32 . . . with non-hinged detent
41/34 . . . with expandable or contractable clamping ring or band
41/36 . . . with clutching ring or disc axially shifted as a result of lost motion between actuating members
43/00 Automatic clutches (varying the relationship between two coaxial shafts F16D 3/10; freewheels, freewheel clutches F16D 41/00)
43/02 . . . actuated entirely mechanically
43/04 . . . controlled by angular speed (F16D 43/24 takes precedence; clutches in which the drive is transmitted through a medium consisting of small particles F16D 37/00)
43/06 . . . with centrifugal masses acting axially a movable pressure ring or the like
Freewheels or freewheel clutches; Automatic clutches

43/08 . . . the pressure ring actuating friction plates, cones or similar axially-movable friction surfaces
43/09 . . . in which the carrier of the centrifugal masses can be stopped
43/10 . . . the centrifugal masses acting directly on the pressure ring, no other actuating mechanism for the pressure ring being provided
43/12 . . . the centrifugal masses acting on, or forming a part of, an actuating mechanism by which the pressure ring can also be actuated independently of the masses
43/14 . . . with centrifugal masses actuating the clamping members directly in a direction which has at least a radial component; with centrifugal masses themselves being the clamping members

2043/145 . . . [the centrifugal masses being pivoting]
43/16 . . . with clutching members having interengaging parts
43/18 . . . with friction clutching members
43/20 . . . controlled by torque, e.g. overload-release clutches, slip-clutches with means by which torque varies the clutching pressure
43/202 . . . of the ratchet type (slip couplings of the ratchet type F16D 7/04)
43/2022 . . . [with at least one part moving axially between engagement and disengagement (F16D 43/206 takes precedence)]
43/2024 . . . [the axially moving part being coaxial with the rotation, e.g. a gear with face teeth]
43/2026 . . . [with a plurality of axially moving parts]
43/2028 . . . [with at least one part moving radially between engagement and disengagement (F16D 43/208 takes precedence)]
43/204 . . . with intermediate balls or rollers
43/206 . . . moving axially between engagement and disengagement
43/208 . . . moving radially between engagement and disengagement
43/21 . . . with friction members {slip couplings of the friction type F16D 7/02)}
43/211 . . . [with radially applied torque-limiting friction surfaces]
43/213 . . . [with axially applied torque-limiting friction surfaces]
43/215 . . . . . . . [with flat friction surfaces, e.g. discs]
43/216 . . . . . . . [with multiple lamellae]
43/218 . . . . . . . [with conical friction surfaces]
43/22 . . . controlled by both speed and torque
43/24 . . . controlled by acceleration or deceleration of angular speed
43/25 . . . controlled by thermo-responsive elements
43/26 . . . acting at definite angular position or disengaging after {consecutive} definite number of rotations (actuating by means of stationary abutment F16D 11/02, F16D 13/02, F16D 15/00; control of change-speed or reversing-gearings conveying rotary motion F16H 59/00 - F16H 63/00)
43/28 . . . actuated by fluid pressure
43/284 . . . controlled by angular speed
43/286 . . . controlled by torque

43/30 . . . Systems of a plurality of automatic clutches

45/00 Freewheels or freewheel clutches combined with automatic clutches

47/00 Systems of clutches, or clutches and couplings, comprising devices of types grouped under at least two of the preceding guide headings

47/02 . . . of which at least one is a coupling (elastic attachment of clutch parts, see the groups for the clutches {clutch flywheels with damping devices F16F 15/10})
47/04 . . . of which at least one is a freewheel (F16D 47/02, F16D 47/06 take precedence; freewheels combined with a clutch to lock the driving and driven members of the freewheel F16D 41/04, F16D 41/20)
47/06 . . . of which at least one is a clutch with a fluid or a semifluid as power-transmitting means

48/00 External control of clutches

48/02 . . . Control by fluid pressure
2048/0203 . . . [with an accumulator; Details thereof]
2048/0206 . . . [in a system with a plurality of fluid-actuated clutches]
2048/0209 . . . [characterised by fluid valves having control pistons, e.g. spools]
2048/0212 . . . [Details of pistons for master or slave cylinders especially adapted for fluid control (for other details of pistons in master or slave cylinders F16D 2025/081, or F16D 25/082)]
2048/0215 . . . [for damping of pulsations within the fluid system]
2048/0218 . . . [Reservoirs for clutch control systems; Details thereof]
2048/0221 . . . [Valves for clutch control systems; Details thereof]
2048/0224 . . . [Details of conduits, connectors or the adaptors therefor specially adapted for clutch control]
2048/0227 . . . [Source of pressure producing the clutch engagement or disengagement action within a circuit; Means for initiating command action in power assisted devices (for details of the source or means per se F16D 25/088, F16D 29/005)]
2048/023 . . . [by pedal actuation (for pedals per se G01G 1/30)]
2048/0233 . . . [by rotary pump actuation]
2048/0236 . . . [with multiple independent pumps, e.g. one per clutch, or for supplying fluid to different systems]
2048/0239 . . . . . . . [One fluid source supplying fluid at high pressure and one fluid source supplying fluid at low pressure]
2048/0242 . . . . . . . [Two or more rotating pumps driven together by the same power source, e.g. connected by a shaft, or a single pump having two or more fluid outputs]
2048/0245 . . . . . . . [Electrically driven rotary pumps]
2048/0248 . . . . . . . [Reversible rotary pumps, i.e. pumps that can be rotated in the two directions]
2048/0251 . . . . . . . [Electric motor driving a piston, e.g. for actuating the master cylinder (for details of the actuator per se F16D 29/00)]
2048/0254 . . . . . . . [Double actuation, i.e. two actuation means can produce independently an engagement or disengagement of the clutch]
Brakes (electrodynamic brake systems for vehicles in general B60L, dynamo-electric brakes H02K)

49/00 Brakes with a braking member co-operating with the periphery of a drum, wheel-rim, or the like (similar clutches F16D 13/10)

49/02 shaped as a helical band or coil with more than one turn, with or without intensification of the braking force by the tension of the band or contracting member (similar clutches F16D 13/08)

49/04 mechanically actuated
Brakes with braking members co-operating with both the periphery and the inner surface of a drum, wheel-rim, or the like (similar clutches F16D 13/20)

55/00  Brakes with substantially-radial braking surfaces pressed together in axial direction, e.g. disc brakes (similar clutches F16D 13/38)

55/04  . . by moving discs or pads away from one another against radial walls of drums or cylinders
55/06  . . without self-tightening action
55/08  . . Mechanically-actuated brakes
55/10  . . Brakes actuated by a fluid-pressure device arranged in or on the brake
55/12  . . . . comprising an expansible fluid-filled flexible member coaxial with the brake
55/14  . . with self-tightening action, e.g. by means of coacting helical surfaces or balls and inclined surfaces
55/15  . . initiated by means of brake-bands or brake-shoes
55/16  . . Mechanically-actuated brakes
55/18  . . Brakes actuated by a fluid-pressure device arranged in or on the brake
55/20  . . . . comprising an expansible fluid-filled flexible member coaxial with the brake
55/22  . . by clamping an axially-located rotating disc between movable braking members, e.g. movable brake discs or brake pads
55/224 . . with a common actuating member for the braking members
55/2245 . . . . [in which the common actuating member acts on two levers carrying the braking members, e.g. tong-type brakes (similar brakes for rail vehicles B61H 5/00)]
55/225 . . the braking members being brake pads
55/2255 . . in which the common actuating member is pivoted
55/226 . . . . in which the common actuating member is moved axially, e.g. floating caliper disc brakes
55/2262 . . . . (the axial movement being guided by open sliding surfaces, e.g. grooves)
55/2265 . . . . the axial movement being guided by one or more pins [engaging bores in the brake support or the brake housing]
55/22655 . . . . (Constructional details of guide pins)
55/227 . . . . by two [or more] pins
55/228 . . with a separate actuating member for each side
55/24 . . with a plurality of axially-movable discs, lamellae, or pads, pressed from one side towards an axially-located member
55/26 . . without self-tightening action
55/28 . . Brakes with only one rotating disc
55/30 . . . . mechanically actuated
55/31 . . . . by means of an intermediate lever
55/32 . . . . actuated by a fluid-pressure device arranged in or on the brake
55/33 . . . . by means of an intermediate lever
55/34 . . . . comprising an expansible fluid-filled flexible member coaxial with the brake
55/36 . . Brakes with a plurality of rotating discs all lying side by side
55/38 . . . . mechanically actuated
55/39 . . . . by means of an intermediate lever
55/40 . . . . actuated by a fluid-pressure device arranged in or on the brake
55/41 . . . . by means of an intermediate lever
55/42 . . . . comprising an expansible fluid-filled flexible member coaxial with the brake
Brakes

55/44 . . . with the rotating part consisting of both central plates and ring-shaped plates arranged concentrically around the central plates
55/46 . . . with self-tightening action
55/48 . . . with discs or pads having a small free angular travel relative to their support, which produces the self-tightening action
55/50 . . . with auxiliary friction members, which may be of different type, producing the self-tightening action

57/00 Liquid-resistance brakes; {Brakes using the internal friction of fluids or fluid-like media, e.g. powders (for braking drums, barrels or ropes of cranes, lift hoists or winches B66D 5/026)}
57/002 . . . [comprising a medium with electrically or magnetically controlled internal friction, e.g. electrorheological fluid, magnetic powder]
57/005 . . . [Details of blades, e.g. shape]
57/007 . . . [with variable brake geometry, e.g. axially movable rotor or stator]
57/02 . . . with blades or like members braked by the fluid
57/04 . . . with blades causing a directed flow, e.g. Föttinger type
57/06 . . . comprising a pump circulating fluid, braking being effected by throttling of the circulation

59/00 Self-acting brakes, e.g. coming into operation at a predetermined speed
59/02 . . . spring-loaded and adapted to be released by mechanical, fluid, or electromagnetic means

61/00 Brakes with means for making the energy absorbed available for use (F16D 57/00 takes precedence)

63/00 Brakes not otherwise provided for; Brakes combining more than one of the types of groups F16D 49/00 - F16D 61/00
63/002 . . . [Brakes with direct electrical or electro-magnetic actuation]
63/004 . . . [comprising a rotor engaged both axially and radially by braking members, e.g. combined drum and disc brakes]
63/006 . . . [Positive locking brakes]
63/008 . . . [Brakes acting on a linearly moving member]

65/00 Parts or details (similar members for clutches F16D 13/58)
65/0006 . . . [Noise or vibration control]
65/0012 . . . [Active vibration dampers]
65/0018 . . . [Dynamic vibration dampers, e.g. mass-spring systems]
65/0025 . . . [Rust- or corrosion-preventing means]
65/0031 . . . [Devices for retaining friction material debris, e.g. dust collectors or filters]
65/0037 . . . [Devices for conditioning friction surfaces, e.g. cleaning or abrasive elements]
65/0043 . . . [Brake maintenance and assembly, tools therefor]
65/005 . . . [Components of axially engaging brakes not otherwise provided for]
65/0056 . . . [Brake supports]
65/0062 . . . [integral with vehicle suspension, e.g. with the steering knuckle]
65/0068 . . . [Brake calipers]
65/0075 . . . [assembled from a plurality of parts]
Brakes

65/127 . . . [characterised by properties of the disc surface; Discs lined with friction material]
65/128 . . . [characterised by means for cooling]
2065/13 . . . [Parts or details of discs or drums]
2065/1304 . . . [Structure]
2065/1308 . . . [one-part]
2065/1312 . . . [circumferentially segmented]
2065/1316 . . . [radially segmented]
2065/132 . . . [layered]
2065/1324 . . . [carrying friction elements]
2065/1328 . . . [internal cavities, e.g. cooling channels]
2065/1332 . . . [external ribs, e.g. for cooling or reinforcement]
2065/1336 . . . [integral part of vehicle wheel]
2065/134 . . . [Connection]
2065/1344 . . . [permanent, e.g. by casting]
2065/1348 . . . [resilient]
2065/1352 . . . [articulated]
2065/1356 . . . [interlocking]
2065/136 . . . . . [with relative movement radially]
2065/1364 . . . . . [with relative movement axially]
2065/1368 . . . . . [with relative movement both radially and axially]
2065/1372 . . . . . (outer circumference)
2065/1376 . . . . . (inner circumference)
2065/138 . . . . . (to wheel)
2065/1384 . . . . . (to wheel hub)
2065/1388 . . . . . (to shaft or axle)
2065/1392 . . . . . (Connection elements)
2065/1396 . . . . . (Ancillary resilient elements, e.g. anti-rattle or retraction springs)
65/14 . Actuating mechanisms for brakes; Means for initiating operation at a predetermined position (brake control systems, parts thereof B60T)

NOTE
In this group, it is desirable to add the indexing codes of groups F16D 2121/00 - F16D 2131/00 relating to actuators.

65/16 . . . arranged in or on the brake
65/18 . . . adapted for drawing members together [. e.g. for disc brakes]
65/183 . . . . . [with force-transmitting members arranged side by side acting on a spot type force- applies][ing member]
65/186 . . . . . [with full-face force-applying member, e.g. annular]
65/22 . . . . . . adapted for pressing members apart [. e.g. for drum brakes]
65/28 . . . . . . arranged apart from the brake
65/38 . . . . Slack adjusters
2065/383 . . . . (for adjusting the spring force in spring-applied brakes)
2065/386 . . . . (driven electrically)
65/40 . . . . . . mechanical
65/42 . . . . . . non-automatic
65/44 . . . . . . by means of direct linear adjustment
65/46 . . . . . . with screw-thread and nut
65/48 . . . . . . with eccentric or helical body
65/50 . . . . . . for angular adjustment of two concentric parts of the brake control system
65/52 . . . . . . self-acting in one direction for adjusting excessive play
65/54 . . . . . . by means of direct linear adjustment
65/543 . . . . . . [comprising a plastically-deformable member]
65/546 . . . . . . [for mounting within the confines of a drum brake]
65/56 . . . . . . with screw-thread and nut
65/561 . . . . . . [for mounting within the confines of a drum brake]
65/562 . . . . . . [arranged between service brake actuator and braking member, and subjected to service brake force]
65/563 . . . . . . [arranged adjacent to service brake actuator, e.g. on parking brake lever, and not subjected to service brake force]
65/565 . . . . . . [arranged diametrically opposite to service brake actuator, and subjected to service brake force]
65/566 . . . . . . [having a temperature-sensitive element preventing adjustment when brake is hot]
65/567 . . . . . . [for mounting on a disc brake]
65/568 . . . . . . [for synchronous adjustment of actuators arranged in parallel]
65/58 . . . . . . with eccentric or helical body
65/60 . . . . . . for angular adjustment of two concentric parts of the brake control systems
65/62 . . . . . . self-acting in both directions for adjusting excessive and insufficient play
65/64 . . . . . . by means of direct linear adjustment
65/66 . . . . . . with screw-thread and nut
65/68 . . . . . . with eccentric or helical body
65/70 . . . . . . for angular adjustment of two concentric parts of the brake control system
65/72 . . . . . . hydraulic
65/74 . . . . . . self-acting in one direction
65/76 . . . . . . self-acting in both directions
65/78 . . . . . . Features relating to cooling
2065/781 . . . . . . [involving phase change of material]
2065/782 . . . . . . [the brake-actuating fluid being used as a coolant]
2065/783 . . . . . . [cooling control or adjustment]
2065/784 . . . . . . [the coolant not being in direct contact with the braking surface]
2065/785 . . . . . . [Heat insulation or reflection]
2065/786 . . . . . . [Fluid spray devices]
2065/787 . . . . . . [Pumps]
2065/788 . . . . . . [Internal cooling channels]
2065/789 . . . . . . [External cooling ribs]
65/80 . . . . . . for externally-engaging brakes
65/807 . . . . . . with open cooling system, e.g. cooled by air
65/813 . . . . . . with closed cooling system
65/82 . . . . . . for internally-engaging brakes
65/827 . . . . . . with open cooling system, e.g. cooled by air
65/833 . . . . . . with closed cooling system
65/84 . . . . . . for disc brakes [(discs characterised by means for cooling F16D 65/128)]
65/847 . . . . . . with open cooling system, e.g. cooled by air
65/853 . . . . . . with closed cooling system

66/00 Arrangements for monitoring working conditions, e.g. wear, temperature
Brakes

71/00 Mechanisms for bringing members to rest in a predetermined position (combined with or controlling clutches F16D 43/26; means for initiating operation of brakes at a predetermined position F16D 65/14; means for securing members after operation F16B 1/02)

71/02 comprising auxiliary means for producing the final movement

71/04 providing for selection between a plurality of positions (F16D 71/02 takes precedence)

F16D 15

2121/00 Type of actuator operation force
2121/005 (unspecified force for releasing a normally applied brake)
2121/02 Fluid pressure
2121/04 acting on a piston-type actuator, e.g. for liquid pressure
2121/06 for releasing a normally applied brake
2121/08 acting on a membrane-type actuator, e.g. for gas pressure
2121/10 for releasing a normally applied brake
2121/12 for releasing a normally applied brake, the type of actuator being irrelevant or not provided for in groups F16D 2121/04 - F16D 2121/10
2121/14 Mechanical
2121/16 for releasing a normally applied brake
2121/18 Electric or magnetic
2121/20 using electromagnets
2121/22 for releasing a normally applied brake
2121/24 using motors
2121/26 for releasing a normally applied brake
2121/28 using electrostrictive or magnetostriective elements, e.g. piezoelectric elements
2121/30 for releasing a normally applied brake
2121/32 using shape memory or other thermo-mechanical elements
2121/34 for releasing a normally applied brake

2123/00 Multiple operation forces
2125/00 Components of actuators
2125/02 Fluid-pressure mechanisms
2125/023 (Pumps)
2125/026 (Pressure-to-pressure converters, e.g. hydropneumatic)
2125/04  Cylinders
2125/06  Pistons
2125/08  Seals, e.g. piston seals
2125/10  Plural pistons interacting by fluid pressure, e.g. hydraulic force amplifiers using different sized pistons
2125/12  Membrane or diaphragm types
2125/14  Fluid-filled flexible members, e.g. enclosed air bladders
2125/16  Devices for bleeding or filling
2125/18  Mechanical mechanisms
2125/20  converting rotation to linear movement or vice versa
2125/22  acting transversely to the axis of rotation
2125/24  Rack-and-pinion
2125/26  Cranks
2125/28  Cams; Levers with cams
2125/30  acting on two or more cam followers, e.g. S-cams
2125/32  acting on one cam follower
2125/34  acting in the direction of the axis of rotation
2125/36  Helical cams, Ball-rotating ramps
2125/38  with plural cam or ball-ramp mechanisms arranged concentrically with the brake rotor axis
2125/40  Screw-and-nut
2125/42  Rack-and-worm gears
2125/44  transmitting rotation
2125/46  Rotating members in mutual engagement
2125/48  with parallel stationary axes, e.g. spur gears
2125/50  with parallel non-stationary axes, e.g. planetary gearing
2125/52  with non-parallel stationary axes, e.g. worm or bevel gears
2125/54  with non-parallel non-stationary axes
2125/56  Shafts for transmitting torque directly
2125/58  transmitting linear movement
2125/582  Flexible element, e.g. spring, other than the main force generating element
2125/585  arranged in parallel with a force-applying member
2125/587  Articulation, e.g. ball-socket
2125/60  Cables or chains, e.g. Bowden cables
2125/62  Fixing arrangements therefor, e.g. cable end attachments
2125/64  Levers
2125/645  with variable leverage, e.g. movable fulcrum
2125/66  Wedges
2125/68  Lever-link mechanisms, e.g. toggles with change of force ratio
2125/70  Rods

2127/00  Auxiliary mechanisms
2127/001  for automatic or self-acting brake operation
2127/002  (speed-responsive)
2127/004  (direction-responsive)
2127/005  (force- or torque-responsive)
2127/007  (for non-linear operation)
2127/008  (Trigger mechanisms)
2127/02  Release mechanisms
2127/04  for manual operation
2127/06  Locking mechanisms, e.g. acting on actuators, on release mechanisms or on force transmission mechanisms
2127/08  Self-amplifying or de-amplifying mechanisms
2127/085  (having additional fluid pressure elements)
2127/10  having wedgeing elements
2127/12  having additional frictional elements

2129/00  Type of operation source for auxiliary mechanisms
2129/02  Fluid-pressure
2129/04  Mechanical
2129/043  (Weights)
2129/046  (Flywheels)
2129/06  Electric or magnetic
2129/065  (Permanent magnets)
2129/08  Electromagnets
2129/10  Motors
2129/12  Electrostrictive or magnetostrictive elements, e.g. piezoelectric
2129/14  Shape memory or other thermo-mechanical elements

2131/00  Overall arrangement of the actuators or their elements, e.g. modular construction
2131/02  of the actuator controllers

2200/00  Materials; Production methods therefor
2200/0004  metallic
2200/0008  Ferro
2200/0013  Cast iron
2200/0017  corrosion-resistant
2200/0021  Steel
2200/0026  Non-ferro
2200/003  Light metals, e.g. aluminium
2200/0034  non-metallic
2200/0039  Ceramics
2200/0043  Ceramic base, e.g. metal oxides or ceramic binder
2200/0047  Ceramic composite, e.g. C/C composite infiltrated with Si or B, or ceramic matrix infiltrated with metal
2200/0052  Carbon
2200/0056  Elastomers
2200/006  containing fibres or particles
2200/0065  Inorganic, e.g. non-asbestos mineral fibres
2200/0069  being characterised by their size
2200/0073  having lubricating properties
2200/0078  laminated
2200/0082  Production methods therefor
2200/0086  Moulding materials together by application of heat and pressure
2200/0091  Impregnating a mat of fibres with a binder
2200/0095  Mixing an aqueous slurry of fibres with a binder, e.g. papermaking process

2250/00  Manufacturing; Assembly
2250/0007  Casting
2250/0015  around inserts
2250/0023  Shaping by pressure
2250/003  Chip removing
2250/0038  Surface treatment
2250/0046  Coating
2250/0053  Hardening
Special features for couplings or clutches

Cooling features not provided for in group F16D 13/72 or F16D 25/123, e.g. heat transfer details

Air cooling

Oil or fluid cooling

Lubrication details not provided for in group F16D 13/74

Details of arrangements of sealings not provided for in group F16D 3/84

Surface characteristics; Details related to material surfaces

Mounting or assembling

Clutches which are normally open, i.e. not engaged in released state

Sensor; Details or arrangements thereof

Concentric actuation rods, e.g. actuation rods extending concentrically through a shaft

Cover or bell housings; Details or arrangements thereof

External control of clutches by electric or electronic means

System to be controlled

Actuator

Electrical type

Electromagnet

Electric motor

Combined with hydraulic actuation

With threaded transmission

Hydraulic

Details about the hydraulic valves

Pneumatic

Clutch

Clutch position

Transmission line of a vehicle

Accessory clutch, e.g. cooling fan, air conditioning

Differential clutch

4WD Clutch dividing power between the front and the rear axle

Power Take Off clutch

Clutch type

Friction clutch

Synchro clutch

Dog-type clutch

Fluid adhesion clutch

Magnetic field, e.g. electro-rheological, magnetisable particles

Automatic clutch, e.g. centrifugal masses

Fluid coupling

One way clutch

Engine

Diesel
Vehicle speed
Vehicle weight

Vehicle wheels
Vehicle wheel speed
Vehicle wheel torque
Slip of vehicle wheels
External to the vehicle

Ambient conditions, e.g. air humidity, air temperature, ambient pressure

Driving conditions, e.g. climbing hills, cornering, traffic

Driving resistance, i.e. external factors having an influence in the traction force, e.g. road friction, air resistance, road slope

Road slope
Distance from the vehicle to an external element, e.g. to an obstacle, to an other vehicle or a target

Parking brake lever
Engine braking signal indicating the use of the engine as a brake

Temperature of the engine
Cooling oil pressure
Engine tunnel air flow rate

Number of shift actuations
Transmission oil properties
Oil temperature
Oil pressure

Engaged transmission ratio
Estimation of the engaged transmission ratio
Detection of transmission in neutral

from the input shaft
Direction of rotation of the input shaft
Speed of the input shaft
Speed change rate of the input shaft

speed of the output shaft
Torque of the output shaft
Speed of the output shaft
Speed change rate of the output shaft

from the transmission

Number of shift actuations

from the vehicle

Detection of a brake actuation by a sensor from the vehicle

Transmission oil properties
Oil temperature
Oil pressure

Engaged transmission ratio
Estimation of the engaged transmission ratio
Detection of transmission in neutral

from the input shaft
Direction of rotation of the input shaft
Speed of the input shaft
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speed of the output shaft
Torque of the output shaft
Speed of the output shaft
Speed change rate of the output shaft

from the transmission

Number of shift actuations

from the vehicle

Detection of a brake actuation by a sensor from the vehicle
2500/50254 . . . . Brake actuated
2500/50257 . . . . During a creep operation
2500/5026 . . . . Gear engaged
2500/50263 . . . . During standing still
2500/50266 . . . . Way of detection
2500/50269 . . . . Engine speed
2500/50272 . . . . Gearing speed
2500/50275 . . . . Estimation of the displacement of the clutch touch-point due to the modification of relevant parameters, e.g. temperature, wear
2500/50278 . . . . Stalling
2500/50281 . . . . Transmitted torque
2500/50284 . . . . Control of secondary clutch in the driveline, i.e. not including clutches in automatic transmission, e.g. in the vicinity of rear axle or on parallel drive shaft
2500/50287 . . . . Torque control
2500/5029 . . . . Reducing drag torque
2500/50293 . . . . Reduction of vibrations
2500/50296 . . . . Limit clutch wear
2500/503 . . . . relating to the accumulator
2500/5035 . . . . Filling level of an accumulator providing fluid for the engagement of the clutch
2500/504 . . . . Relating the engine
2500/5041 . . . . Control of engine accessories, e.g. air conditioning, pumps, auxiliary drive
2500/5043 . . . . Engine fuel consumption
2500/5045 . . . . Control of engine at idle, i.e. controlling engine idle conditions, e.g. idling speed
2500/5046 . . . . Preventing engine over-speed, e.g. by actuation of the main clutch
2500/5048 . . . . Stall prevention
2500/5056 . . . . Relating the transmission
2500/50607 . . . . Facilitating engagement of a dog clutches, e.g. preventing of gear butting
2500/50615 . . . . Facilitating disengagement of a dog clutch, e.g. by applying a pretension on the disengaging elements
2500/50623 . . . . Preventing transmission load change
2500/5063 . . . . Shaft dither, i.e. applying a pulsating torque to a (transmission) shaft to create a buzz or dither, e.g. to prevent tooth butting or gear locking
2500/50638 . . . . Shaft speed synchronising, e.g. using engine, clutch outside transmission
2500/50646 . . . . Control of the main clutch to prevent or release a tooth-to-tooth condition in the transmission
2500/50653 . . . . Gearing shifting without the interruption of drive
2500/50661 . . . . Transmission input torque
2500/50669 . . . . Neutral control, i.e. preventing creep or drag torque being transmitted in a transmission with a torque converter when the vehicle is stationary
2500/50676 . . . . Optimising drive-train operating point, e.g. selecting gear ratio giving maximum fuel economy, best performance
2500/50684 . . . . Torque resume after shifting
2500/50692 . . . . Simulate the characteristics of a torque converter
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2500/5075 . . . . Prevention or regulation of vehicle's wheel slip
2500/508 . . . . Relating driving conditions

2500/50808 . . . . Cold starting
2500/50816 . . . . Control during a braking operation, e.g. during ABS control
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2500/50866 . . . . Parking, i.e. control of drive units during parking
2500/50875 . . . . Driving in reverse
2500/50883 . . . . Stop-and-go, i.e. repeated stopping and starting, e.g. in traffic jams
2500/50891 . . . . Towing or towed
2500/51 . . . . Relating safety
2500/5102 . . . . Detecting abnormal operation, e.g. unwanted slip or excessive temperature
2500/5104 . . . . Preventing failures
2500/5106 . . . . Overheat protection
2500/5108 . . . . Failure diagnosis
2500/5111 . . . . Leak detection
2500/5112 . . . . Using signals from redundant sensors
2500/5114 . . . . Failsafe
2500/5116 . . . . Manufacture, testing, calibrating, i.e. test or calibration of components during or soon after assembly, e.g. at the end of the production line
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- **Position**
- **Clutch position change rate**
- **Quick displacement to clutch touch point**
- **Voltage**
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**Mathematical model**

**Strategy of control**

**Adaptive correction; Modifying control system parameters, e.g. gains, constants, look-up tables**

**Feed-back**

**PI control**

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**PID control**

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**Predictor methods**

**State analysis; Analysing potential states of the machine and developing control strategies at each state**