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 E21B; for transmitting motion through a wall without relatively-moving surfaces F16J 15/50)

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)

1/02 . for connecting two abutting shafts or the like
1/027 . non-disconnectable, e.g. involving gluing, welding or the like
1/033 . by clamping together two faces perpendicular to the axis of rotation, e.g. with bolted flanges
1/04 . with clamping hub; with hub and longitudinal key
1/05 . with radial clamping due to axial loading of at least one pair of conical surfaces

1/06 . for attachment of a member on a shaft or on a shaft-end (attachment of marine propellers on shafts B63H 23/34)
2001/062 . [characterised by adaptors where hub bores being larger than the shaft]
1/064 . non-disconnectable
1/068 . involving gluing, welding or the like
1/072 . involving plastic deformation (plastic welding F16D 1/068)
1/076 . by clamping together two faces perpendicular to the axis of rotation, e.g. with bolted flanges
1/08 . with clamping hub; with hub and longitudinal key
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 . [with radial clamping due to tilting of a hub part or ring about a diametral axis]
Couplings for transmitting mechanical rotation

1/087 . . . . . . . with radial clamping due to rotation along an eccentric surface, e.g. arcuate wedging elements (similar clutches F16D 1/080; 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 41/206)

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 1/082)

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 (circlips 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

(continued)

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

2003/2023 . . . [with linear rolling bearings between raceway and trunion mounted shoes]

2003/2026 . . . [with trunion rings, i.e. with tripod joints having rollers supported by a ring on the trunion]

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

3/2052 . . . . . . [having two pins]

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

2003/22303 . . . . . . [Details of ball cages]

2003/22306 . . . . . . [having counter tracks, i.e. ball track surfaces which diverge in opposite directions]

2003/22309 . . . . . . [Details of grooves]

2003/22313 . . . . . . [Details of the inner part of the core or means for attachment of the core on the shaft]

2003/22316 . . . . . . [Means for fastening or attaching the bellows or gaiters]

2003/2232 . . . . . . [Elements arranged in the hollow space between the end of the inner shaft and the outer joint member]

2003/22323 . . . . . . [Attachments to the shaft of the inner joint member whereby the attachments are distanced from the core]

2003/22326 . . . . . . [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]

3/2233 . . . . . . 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 3/364 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 3/56 takes precedence)
3/725 . . . [with an intermediate member made of fibre-reinforced resin (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 3/10 - F16D 35/00)
3/82 . . . with a coupling element in the form of a pneumatic tube (similar couplings 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]
2003/846 . . . [Venting arrangements for flexible seals, e.g. ventilation holes]
3/848 . . . [allowing relative movement of joint parts due to sliding between parts of the cover]

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 31/00 - F16D 35/00)
7/002 . . . [the torque being transmitted and limited by yielding of an elastomeric race]
Clutches with mechanically-actuated clutching members

F16D

11/02 . . . disengaged by a contact of a part mounted on the clutch with a stationarily-mounted member
11/04 . . . with clutching members movable only axially
11/06 . . . with clutching members movable otherwise than only axially, e.g. rotatable keys
11/08 . . . actuated by moving a non-rotating part axially (actuating-mechanism in the relevant groups)
11/10 . . . with clutching members movable only axially
11/12 . . . with clutching members movable otherwise than only axially
11/14 . . . with clutching members movable only axially (F16D 11/02, F16D 11/08 take precedence)
11/16 . . . with clutching members movable otherwise than only axially (F16D 11/02, F16D 11/08 take precedence)

13/00 Friction clutches (arrangements for synchronisation F16D 23/02)
13/02 . . . disengaged by the contact of a part mounted on the clutch with a stationarily-mounted member
13/025 . . . (with a helical band or equivalent member with two or more turns embracing a drum or the like (electromagnetically actuated F16D 27/105))
13/04 . . . 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)
13/06 . . . with clutching members movable otherwise than only axially (F16D 13/08, F16D 13/12 take precedence)
13/08 . . . 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)
13/10 . . . 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)
13/12 . . . 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)
13/14 . . . 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)
13/16 . . . shaped as radially-movable segments
13/18 . . . shaped as linked or separately-pivoted segments
13/20 . . . with clutching members co-operating with both the periphery and the inner surface of a drum or wheel-rim (similar brakes F16D 53/00)
13/22 . . . with axially-movable clutching members (similar brakes F16D 55/00)
13/24 . . . with conical friction surfaces (cone clutches)
13/26 . . . . . . . . in which the or each axially-movable member is pressed exclusively against an axially-located member
13/28 . . . . . . . . with means for increasing the effective force between the actuating sleeve or equivalent member and the pressure member
13/30 . . . . . . . . in which the clutching pressure is produced by springs only
13/32 . . . . . . . . in which two or more axially-movable members are pressed from one side towards an axially-located member
13/34 . . . . . . . . with means for increasing the effective force between the actuating sleeve or equivalent member and the pressure member
13/36 . . . . . . . . in which the clutching pressure is produced by springs only
13/38 . . . . . . . . with flat clutching surfaces, e.g. discs
13/385 . . . . . . . . (double clutches, i.e. comprising two friction discs mounted on one driven shaft (with two concentric driven shafts F16D 21/06))
13/40 . . . . . . . . in which the or each axially-movable member is pressed exclusively against an axially-located member
13/42 . . . . . . . . with means for increasing the effective force between the actuating sleeve or equivalent member and the pressure member
13/44 . . . . . . . . in which the clutching pressure is produced by springs only
13/46 . . . . . . . . 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
13/48 . . . . . . . . with means for increasing the effective force between the actuating sleeve or equivalent member and the pressure member
13/50 . . . . . . . . in which the clutching pressure is produced by springs only
13/505 . . . . . . . . (Devices located between the flywheel and the driven disc, and biasing the driven disc away from the flywheel towards the disengaged position)
13/52 . . . . . . . . Clutches with multiple lamellae (Clutches in which three or more axially moveable 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))
13/54 . . . . . . . . with means for increasing the effective force between the actuating sleeve or equivalent member and the pressure member
13/56 . . . . . . . . in which the clutching pressure is produced by springs only
2013/565 . . . . . . . . (with means for releasing the clutch pressure in case of back torque)
13/58 . . . . . . . . Details (tools for assembling or disassembling clutches B25B 27/0064)
13/581 . . . . . . . . (Securing means for transportation or shipping)
13/583 . . . . . . . . (Diaphragm-springs, e.g. Belleville (co-operation with a disengaging thrust ring or bearing F16D 23/14))
13/585 . . . . . . . . (Arrangements or details relating to the mounting or support of the diaphragm on the clutch on the clutch cover or the pressure plate)
2013/586 . . . . . . . . (the cover housing is formed by diaphragm springs)
2013/588 . . . . . . . . (the diaphragm springs are arranged outside the cover housing)
13/60 . . . . . . . . Clutching elements (friction lining or attachment thereof F16D 69/00)
13/62 . . . . . . . . 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 \((\text{one or more discs connected to the linings transmitting torque to one or more discs connected to the hub by helical springs in windows in the discs, i.e. rotary vibration dampers F16F 15/12})\)

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 \((\text{clutch flywheels comprising two or more masses with a rotational damper F16F 15/12})\)

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

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 clamping 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 \((\text{F16D 13/08, F16D 13/12 take precedence})\)

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]

23/0618 . . . . [Details of blocking mechanism comprising a helical spring loaded element, e.g. ball]

23/0625 . . . . [Details of members being coupled, e.g. gears]

23/0631 . . . . [Sliding sleeves; Details thereof]

23/0637 . . . . [Details relating to the hub member on which the sliding is arranged]

23/0643 . . . . [Synchro friction clutches with flat plates, discs or lamellae]
Clutches with mechanically-actuated clutching members

F16D

2023/065  . . .  [Means to provide additional axial force for self-energising, e.g. by using torque from the friction clutch]
2023/0656  . . .  [Details of the tooth structure; Arrangements of teeth]
2023/0662  . . .  [Details relating to special geometry of arrangements of teeth]
2023/0668  . . .  [Details relating to tooth end or tip geometry]
2023/0675  . . .  [Details relating to special undercut geometry]
2023/0681  . . .  [Double cone synchronesh clutches]
2023/0687  . . .  [Clutches with hydraulic actuation]
2023/0693  . . .  with a blocking mechanism that only releases the clutching member on synchronisation (in combination with an additional friction clutch F16D 23/06)
23/08  . . .  automatically producing the engagement of the clutch when the clutch members are moving at the same speed; Indicating synchronisation
23/10  . . .  Mechanically clutch-actuating mechanisms arranged outside the clutch as such (specific for combined clutches F16D 21/00; mechanisms specific for synchronisation F16D 23/02)
23/12  . . .  [Clutch actuation by cams, ramps or ball-screw mechanisms]
23/16  . . .  [Actuation by rocker lever; Rocker levers therefor]
23/14  . . .  Clutch-actuating sleeves {or bearings}; Actuating members directly connected to clutch-actuating sleeves {or bearings}
23/141  . . .  [characterised by using a fork; Details of forks]
23/142  . . .  [with a resilient member acting radially between the bearing and its guide means]
23/143  . . .  [Arrangements or details for the connection between the release bearing and the diaphragm]
23/144  . . .  [With a disengaging thrust-ring distinct from the release bearing, and secured to the diaphragm]
23/145  . . .  Arrangements for the connection between the thrust-ring and the diaphragm]
23/146  . . .  [Arrangements for the connection between the thrust-ring and the release bearing]
23/147  . . .  [bearing with rolling elements having at least one race or part fixed to the race blind axially, e.g. cup-shaped]
23/148  . . .  [Guide-sleeve receiving the clutch release bearing]

Clutches actuated non-mechanically (arrangements for synchronisation F16D 23/02; fluid clutches F16D 31/00 - F16D 39/00; automatic clutches F16D 41/00 - F16D 45/00; dynamo-electric clutches H02K 49/00; clutches using electrostatic attraction H02N 13/00)

25/00  Fluid-actuated clutches
25/02  . with means for actuating or keeping engaged by a force derived at least partially from one of the shafts to be connected
25/04  . 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])
25/081  . . .  [Hydraulic devices that initiate movement of pistons in slave cylinders for actuating clutches, i.e. master cylinders]
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 Magentically- (or electrically-) actuated clutches; Control or electric circuits therefor (clutches with magnetisable particles F16D 37/02; {with electrorheological fluids F16D 37/08/08})
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]
Clutches actuated non-mechanically

Fluid clutches in which the clutching is predominantly obtained by fluid adhesion

Couplings or clutches with a fluid or a semi-fluid as a power-transmitting means

Fluid couplings or clutches of the hydrokinetic type

Clutches in which the drive is transmitted through a medium consisting of small particles, e.g. centrifugally speed-responsive
Freewheels or freewheel clutches: Automatic clutches
(F16D 31/00 - F16D 39/00 take precedence)

41/00 Freewheels or freewheel clutches (cycle brakes controlled by back-pedalling B62L 5/00 {; one-way linear clutches F16D 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]

41/0608 . . . [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)

41/0643 . . . [the intermediate coupling members being of more than one size]
41/0646 . . . [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
41/0665 . . . [characterised by there being no cage other than the inner and outer race for distributing the intermediate members]

43/00 Automatic clutches (varying the relationship between two coaxial shafts F16D 31/00; freewheels, freewheel clutches F16D 41/00)
43/02 . . . [actuated entirely mechanically]
43/03 . . . [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 clutching members directly in a direction which has at least a radial component; with centrifugal masses themselves being the clutching 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 25082)]

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

49/06 . . . fluid actuated
49/08 . shaped as an encircling band extending over approximately 360 degrees
49/10 . . . mechanically actuated (self-tightening F16D 49/20)
49/12 . . . fluid actuated
49/14 . shaped as a fluid-filled flexible member actuated by variation of the fluid pressure
49/16 . Brakes with two brake-blocks (self-tightening F16D 49/20)
49/18 . Brakes with three or more brake-blocks (self-tightening F16D 49/20)
49/20 . Self-tightening brakes (with helical or coil with more than one turn F16D 49/02)
49/22 . . . with an auxiliary friction member initiating or increasing the action of the brake

51/00 Brakes with outwardly-movable braking members co-operating with the inner surface of a drum or the like (similar clutches F16D 13/14)
2051/001 . . . [Parts or details of drum brakes]
2051/003 . . . [Brake supports]
2051/005 . . . {Protective covers}
2051/006 . . . [Braking members arranged axially spaced, e.g. side by side]
2051/008 . . . [Brakes with only one substantially rigid braking member]
51/02 . . . shaped as one or more circumferential band (similar clutches F16D 13/12)
51/04 . . . mechanically actuated
51/06 . . . fluid actuated
51/08 . shaped as an expansible fluid-filled flexible member
51/10 . shaped as exclusively radially-movable brake-shoes
51/12 . . . mechanically actuated
51/14 . . . fluid actuated
51/16 . shaped as brake-shoes pivoted on a fixed or nearly-fixed axis
51/18 . . . with two brake-shoes
51/20 . . . extending in opposite directions from their pivots
51/22 . . . . mechanically actuated
51/24 . . . . fluid actuated
51/26 . both extending in the same direction from their pivots
51/28 . . . . mechanically actuated
51/30 . . . . fluid actuated
51/32 . . . with three or more brake shoes
51/34 . . . extending in opposite directions from their pivots
51/36 . . . . mechanically actuated
51/38 . . . . fluid actuated
51/40 . . . all extending in the same direction from their pivots
51/42 . . . . mechanically actuated
51/44 . . . . fluid actuated
51/46 . . Self-tightening brakes with pivoted brake shoes, {i.e. the braked member increases the braking action}
51/48 . . . with two linked or directly-interacting brake shoes
51/50 . . . mechanically actuated
51/52 . . . fluid actuated
53/00 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)

2055/0004 ... [Parts or details of disc brakes]
2055/0007 ... [Brake supports]
2055/0012 ... [integral with vehicle suspension]
2055/0016 ... [Brake calipers]
2055/002 ... [assembled from a plurality of parts]
2055/0027 ... [comprising a flat frame member]
2055/0029 ... [Retraction devices]
2055/0033 ... [Fully-enclosing housings]
2055/0037 ... [Protective covers]
2055/0041 ... [Resilient elements interposed directly between the actuating member and the brake support, e.g. anti-rattle springs]
2055/0045 ... [Braking members arranged non-symmetrically with respect to the brake disc]
2055/005 ... [Brakes straddling an annular brake disc radially internally]
2055/0054 ... [Brakes located in the radial gap between two coplanarly arranged annular brake discs]
2055/0058 ... [Fully lined, i.e. braking surface extending over the entire disc circumference]
2055/0062 ... [Partly lined, i.e. braking surface extending over only a part of the disc circumference]
2055/0066 ... [Brakes having more than one actuator on the same side of the disc]
2055/007 ... [Pins holding the braking members]
2055/0075 ... [Constructional features of axially engaged brakes]
2055/0079 ... [with braking members arranged non-symmetrically with respect to the rotor]
2055/0083 ... [with brake actuator located radially inside of an annular rotor]
2055/0087 ... [with brake actuator located between two coplanar annular rotors]
2055/0091 ... [Plural actuators arranged side by side on the same side of the rotor]
2055/0095 ... [Plural rotors with different properties, e.g. to influence working conditions like wear or temperature]
55/02 ... with axially-movable discs or pads pressed against axially-located rotating members
55/025 ... [with two or more rotating discs at least one of them being located axially]
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 . . . [with variable brake geometry, e.g. axially movable rotor or stator]

57/007 . . . [with blades or like members braked by the fluid]

57/009 . . . with blades causing a directed flow, e.g. Föttinger type

57/011 . . . 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 . . . [Brake calipers]

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 B60D)

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-applying 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 . . .液压

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 {disks 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

67/00 Combinations of couplings and brakes:
Combinations of clutches and brakes (combinations of couplings and clutches F16D 47/02; conjoint control of brake systems and driveline clutches in vehicles B60W 10/02; B60W 10/18)

67/02 . Clutch-brake combinations
67/04 . fluid actuated
67/06 . electromagnetically actuated

69/00 Friction linings; Attachment thereof; Selection of coacting friction substances or surfaces (clutching elements F16D 13/60; braking members F16D 65/02)

2069/001 . [Material of friction lining and support element of same or similar composition]
2069/002 . [Combination of different friction materials]
2069/003 . [Selection of coating friction materials]
2069/004 . [Profiled friction surfaces, e.g. grooves, dimples]
2069/005 . [having a layered structure]
2069/006 . [comprising a heat-insulating layer]
2069/007 . [comprising a resilient layer]
2069/008 . [Layers of fibrous materials]
2069/009 . [Linings attached to both sides of a central support element, e.g. a carrier plate]

69/02 . Compositions of linings; [Methods of manufacturing]

NOTE

Indexing codes F16D 69/021 - F16D 2250/0053 are used for indexing aspects relating to compositions or manufacturing of friction linings

69/021 . [containing asbestos]
69/022 . [in the form of fibres]
69/023 . [Composite materials containing carbon and carbon fibres or fibres made of carbonizable material]
69/025 . [Compositions based on an organic binder]
69/026 . [containing fibres]
69/027 . [Compositions based on metals or inorganic oxides]
69/028 . [containing fibres]

69/04 . Attachment of linings
69/0408 . [specially adapted for plane linings]
69/0416 . [specially adapted for curved linings]
2069/0425 . [Attachment methods or devices]
2069/0433 . [Connecting elements not integral with the braking member, e.g. bolts, rivets]

2069/0441 . [Mechanical interlocking, e.g. roughened lining carrier, mating profiles on friction material and lining carrier]

2069/045 . [Bonding]
2069/0458 . [metallurgic, e.g. welding, brazing, sintering]
2069/046 . [chemical, e.g. using adhesives, vulcanising]
2069/0475 . [comprising thermal treatment]
2069/0483 . [Lining or lining carrier material shaped in situ]

2069/0491 . [Tools, machines, processes]

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 F16D 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)

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 magnetostrictive 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 cam-ramp mechanisms
arranged concentrically with the brake rotor
2125/40 . . . . . . . Screw-and-nut
2125/405 . . . . . . . { with differential thread }
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
2125/565 . . . . . . . {flexible}
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}
2127/002 . . . . . . . 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 magnetostriective 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

2220/00 Manufacturing; Assembly
2220/0007 . . . Casting
2220/0015 . . . around inserts
2220/0023 . . . Shaping by pressure
2220/003 . . . Chip removing
2220/0038 . . . Surface treatment
2220/0046 . . . Coating
2220/0053 . . . Hardening
2300/00  **Special features for couplings or clutches**

2300/02  . . . Overheat protection, i.e. means for protection against overheating

2300/021  . . . Cooling features not provided for in group F16D 13/72 or F16D 25/123, e.g. heat transfer details

2300/0212 . . . Air cooling

2300/0214 . . . Oil or fluid cooling

2300/06  . . . Lubrication details not provided for in group F16D 13/74

2300/08  . . . Details or arrangements of sealings not provided for in group F16D 3/84

2300/10  . . . Surface characteristics; Details related to material surfaces

2300/12  . . . Mounting or assembling

2300/14  . . . Clutches which are normally open, i.e. not engaged in released state

2300/18  . . . Sensor; Details or arrangements thereof

2300/22  . . . Vibration damping

2300/24  . . . Concentric actuation rods, e.g. actuation rods extending concentrically through a shaft

2300/26  . . . Cover or bell housings; Details or arrangements thereof

2500/00  **External control of clutches by electric or electronic means**

2500/10  . . . System to be controlled

2500/102  . . . Actuator

2500/1021 . . . Electrical type

2500/1022 . . . Electromagnet

2500/1023 . . . Electric motor

2500/1024 . . . combined with hydraulic actuation

2500/1025 . . . with threaded transmission

2500/1026 . . . Hydraulic

2500/1027 . . . Details about the hydraulic valves

2500/1028 . . . Pneumatic

2500/104  . . . Clutch

2500/10406 . . . Clutch position

2500/10412 . . . Transmission line of a vehicle

2500/10418 . . . Accessory clutch, e.g. cooling fan, air conditioning

2500/10425 . . . Differential clutch

2500/10431 . . . 4WD Clutch dividing power between the front and the rear axle

2500/10437 . . . Power Take Off clutch

2500/10443 . . . Clutch type

2500/1045  . . . Friction clutch

2500/10456 . . . Synchro clutch

2500/10462 . . . Dog-type clutch

2500/10468 . . . Fluid adhesion clutch

2500/10475 . . . Magnetic field, e.g. electro-rheological, magnetisable particles

2500/10481 . . . Automatic clutch, e.g. centrifugal masses

2500/10487 . . . Fluid coupling

2500/10493 . . . One way clutch

2500/106 . . . Engine

2500/1062 . . . Diesel
2500/3056 . . . . Cooling oil temperature
2500/3058 . . . . Cooling oil pressure
2500/306 . . from the engine
2500/3061 . . . . Engine inlet air flow rate
2500/3062 . . . . Engine braking signal indicating the use of the engine as a brake
2500/3063 . . . . Engine fuel flow rate
2500/3064 . . . . Temperature of the engine
2500/3065 . . . . Torque of the engine
2500/3066 . . . . Torque change rate of the engine
2500/3067 . . . . Speed of the engine
2500/3068 . . . . Speed change rate of the engine
2500/3069 . . . . Engine ignition switch
2500/308 . . . . from the transmission
2500/30801 . . . . Number of shift actions
2500/30802 . . . . Transmission oil properties
2500/30803 . . . . Oil temperature
2500/30805 . . . . Oil pressure
2500/30806 . . . . Engaged transmission ratio
2500/30807 . . . . Estimation of the engaged transmission ratio
2500/30808 . . . . Detection of transmission in neutral
2500/3081 . . . . from the input shaft
2500/30812 . . . . Direction of rotation of the input shaft
2500/30814 . . . . Torque of the input shaft
2500/30816 . . . . Speed of the input shaft
2500/30818 . . . . Speed change rate of the input shaft
2500/3082 . . . . from the output shaft
2500/30822 . . . . Torque of the output shaft
2500/30825 . . . . Speed of the output shaft
2500/30827 . . . . Speed change rate of the output shaft
2500/31 . . . . from the vehicle
2500/3101 . . . . Detection of a brake actuation by a sensor on the brake (brake pedal actuation
F16D 2500/31426)
2500/3102 . . . . Vehicle direction of travel, i.e. forward/reverse
2500/3104 . . . . Travelled distance
2500/3105 . . . . Operational Time of clutches during vehicle life
2500/3107 . . . . Vehicle weight
2500/3108 . . . . Vehicle speed
2500/3109 . . . . Vehicle acceleration
2500/3111 . . . . Standing still, i.e. signal detecting when the vehicle is standing still or bellow a certain limit speed
2500/3112 . . . . Vehicle acceleration change rate
2500/3114 . . . . Vehicle wheels
2500/3115 . . . . Vehicle wheel speed
2500/3117 . . . . Vehicle wheel torque
2500/3118 . . . . Slip of vehicle wheels
2500/312 . . . . External to the vehicle
2500/3121 . . . . Ambient conditions, e.g. air humidity, air temperature, ambient pressure
2500/3122 . . . . Ambient temperature
2500/3124 . . . . Driving conditions, e.g. climbing hills, cornering, traffic
2500/3125 . . . . Driving resistance, i.e. external factors having an influence in the traction force, e.g. road friction, air resistance, road slope
2500/3127 . . . . Road slope
2500/3128 . . . . Distance from the vehicle to an external element, e.g. to an obstacle, to an other vehicle or a target

2500/314 . . . . from the user
2500/31406 . . . . input from pedals
2500/31413 . . . . Clutch pedal position
2500/3142 . . . . Clutch pedal position rate
2500/31426 . . . . Brake pedal position
2500/31433 . . . . Brake pedal position threshold, e.g. switch
2500/3144 . . . . Accelerator pedal position
2500/31446 . . . . Accelerator pedal position change rate
2500/31453 . . . . Accelerator pedal position threshold, e.g. switch
2500/3146 . . . . input from levers
2500/31466 . . . . Gear lever
2500/31473 . . . . Parking brake lever
2500/3148 . . . . Detection of user presence
2500/31486 . . . . Recognition of user style of driving, e.g. sportive, calm, nervous
2500/31493 . . . . Switches on the dashboard
2500/316 . . . . Other signal inputs not covered by the groups above
2500/3161 . . . . Signal providing information about the state of engine accessories
2500/3163 . . . . Using the natural frequency of a component as input for the control
2500/3165 . . . . Using the moment of inertia of a component as input for the control
2500/3166 . . . . Detection of an elapsed period of time
2500/3168 . . . . Temperature detection of any component of the control system
2500/50 . . . . Problem to be solved by the control system
2500/501 . . . . Relating the actuator
2500/5012 . . . . Accurate determination of the clutch positions, e.g. treating the signal from the position sensor, or by using two position sensors for determination
2500/5014 . . . . Filling the actuator cylinder with fluid
2500/5016 . . . . Shifting operation, i.e. volume compensation of the master cylinder due to wear, temperature changes or leaks in the cylinder
2500/5018 . . . . Calibration or recalibration of the actuator
2500/502 . . . . Relating the clutch
2500/50203 . . . . Transition between manual and automatic control of the clutch
2500/50206 . . . . Creep control
2500/50209 . . . . Activation of the creep control operation
2500/50212 . . . . Accelerator pedal
2500/50215 . . . . Brake pedal
2500/50218 . . . . Clutch pedal
2500/50221 . . . . Manual switch actuated by the user
2500/50224 . . . . Drive-off
2500/50227 . . . . Control of clutch to control engine
2500/5023 . . . . Determination of the clutch wear
2500/50233 . . . . Clutch wear adjustment operation
2500/50236 . . . . Adaptations of the clutch characteristics, e.g. curve clutch capacity torque - clutch actuator displacement
2500/50239 . . . . Soft clutch engagement
2500/50242 . . . . Cleaning of clutches, e.g. controlling the engine or the clutch to provoke vibrations eliminating particles from the clutch friction surfaces
2500/50245 . . . . Calibration or recalibration of the clutch touch-point
2500/50248 . . . . During assembly
2500/50251 . . . . During operation
F16D

2500/50254 . . . . . . . Brake actuated
2500/50257 . . . . . . . During a creep operation
2500/50256 . . . . . . . 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
2500/5050 . . . . . . . Relating the transmission
2500/5060 . . . . . . . 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 . . . . . . . Limit 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
2500/507 . . . . . . . Relating the vehicle
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
2500/50825 . . . . . . . Hill climbing or descending
2500/50833 . . . . . . . Control during a stability control operation [ESP]
2500/50841 . . . . . . . Hill hold
2500/5085 . . . . . . . Coasting
2500/50858 . . . . . . . Selecting a Mode of operation
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
2500/5051 . . . . . . . Relating safety
2500/50102 . . . . . . . Detecting abnormal operation, e.g. unwanted slip or excessive temperature
2500/50104 . . . . . . . Preventing failures
2500/50106 . . . . . . . Overheat protection
2500/50108 . . . . . . . Failure diagnosis
2500/5011 . . . . . . . Leak detection
2500/50112 . . . . . . . Using signals from redundant sensors
2500/50114 . . . . . . . Failsafe
2500/50116 . . . . . . . Manufacture, testing, calibrating, i.e. test or calibration of components during or soon after assembly, e.g. at the end of the production line (F16D 2500/50248 takes precedence)
2500/50118 . . . . . . . Maintenance
2500/5012 . . . . . . . Relating to the driver
2500/50122 . . . . . . . Improve passengers comfort
2500/50124 . . . . . . . Driver error, i.e. preventing effects of unintended or incorrect driver inputs
2500/50126 . . . . . . . Improving response to driver inputs
2500/50128 . . . . . . . Driver workload reduction
2500/503 . . . . . . . General
2500/5025 . . . . . . . Improve response of control system
2500/50270 . . . . . . . Details about the implementation of the control system
2500/702 . . . . . . . Look-up tables
2500/70205 . . . . . . . Clutch actuator
2500/70211 . . . . . . . Force
2500/70217 . . . . . . . Pressure
2500/70223 . . . . . . . Current
2500/70229 . . . . . . . Voltage
2500/70235 . . . . . . . Displacement
2500/70241 . . . . . . . Angle
2500/70247 . . . . . . . Engine
2500/70252 . . . . . . . Clutch torque
2500/70258 . . . . . . . Throttle
2500/70264 . . . . . . . Stroke
2500/7027 . . . . . . . Engine speed
2500/70276 . . . . . . . Slip
2500/70282 . . . . . . . Time
2500/70288 . . . . . . . Clutch pedal position
2500/70294 . . . . . . . Valve look-up tables
2500/704 . . . . . . . Output parameters from the control unit; Target parameters to be controlled
2500/70402 . . . . . . . Actuator parameters
2500/70404 . . . . . . . Force
2500/70406 . . . . . . . Pressure
2500/70408 . . . . . . . Torque

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Position
Clutch position change rate
Quick displacement to clutch touch point
Angle
Current
Voltage

Clutch parameters
Outputting a clutch engaged-disengaged signal
Clutch slip
Clutch slip change rate
From the input shaft
Input shaft torque
Input shaft speed
From the output shaft
Output shaft torque
Output shaft speed
Output shaft speed rate

Clutch cooling parameters
for regulating the amount of fluid flow
On/off switching of the cooling fluid flow
Engine parameters
Engine speed
Engine speed change rate
Engine torque
Engine torque change rate
Opening of the throttle valve
Transmission parameters
Input shaft
Input shaft torque
Input shaft torque change rate
Input shaft speed
Input shaft speed change rate
Output shaft
Output shaft power
Output shaft torque
Output shaft torque change rate
Output shaft speed
Output shaft speed change rate
Selection of the gear ratio
Brake parameters
Vehicle parameters
Vehicle speed
Vehicle acceleration
Vehicle acceleration change rate
Strategy of control
Adaptive correction; Modifying control system parameters, e.g. gains, constants, look-up tables
Feed-back
PI control
PD control
PID control
Feed-forward
Fuzzy logic
Inverse model
Neuronal network
Open loop
Predictor methods
State analysis; Analysing potential states of the machine and developing control strategies at each state

Signal filtering
Statistical calculations
using histograms
using regressions
using maximum or minimum values
with plausibility checks
Mathematical model
of the clutch
of the driver
of the vehicle
Actions
Driver alarm
Acoustic alarms
Visual alarms
Inhibit control automatically
Gearshift to neutral
Others
Engine torque calculation
Pulsed signal; Generating or processing pulsed signals; PWM, width modulation, frequency or amplitude modulation

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