

CPC COOPERATIVE PATENT CLASSIFICATION

F MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING (NOTE omitted)

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.

WARNING

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 ;
F16D65/35	covered by	F16D 63/00 .

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}

1/0817 . . . {with radial clamping due to rotation along an eccentric surface, e.g. arcuate wedging elements (similar clutches [F16D 17/00](#); 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)}	1/10	. Quick-acting couplings in which the parts are connected by simply bringing them together axially
1/0829	. . . {with radial loading of both hub and shaft by an intermediate ring or sleeve (F16D 1/0817 , F16D 1/0823 , F16D 1/093 take precedence)}	1/101	. . {without axial retaining means rotating with the coupling}
1/0835	. . . . {due to the elasticity of the ring or sleeve}	2001/102	. . {the torque is transmitted via polygon shaped connections}
1/0841	. . . . {due to axial loading of the ring or sleeve, e.g. Belleville washers}	2001/103	. . {the torque is transmitted via splined connections}
1/0847	. . . {with radial clamping due to a radial screw}	1/104	. . having retaining means rotating with the coupling and acting only by friction
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)}	1/108	. . having retaining means rotating with the coupling and acting by interengaging parts, i.e. positive coupling
1/0858	. . . . {due to the elasticity of the hub (including shrink fits)}	1/112	. . . the interengaging parts comprising torque-transmitting surfaces, e.g. bayonet joints
1/0864	. . . . {due to tangential loading of the hub, e.g. a split hub}	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)
1/087	. . . . {due to other loading elements in the hub or shaft}	1/12	. allowing adjustment of the parts about the axis (during motion F16D 3/10)
1/0876	. . . {with axial keys and no other radial clamping}	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)
1/0882	. . . . {the key being axially tapered and tightening when loaded axially}	3/005	. {incorporating leaf springs, flexible parts of reduced thickness or the like acting as pivots}
1/0888	. . . . . {the key having two axially tapered interengaging parts}	3/02	. adapted to specific functions (universal joints, see the appropriate groups)
1/0894	. . . {with other than axial keys, e.g. diametral pins, cotter pins and no other radial clamping}	3/04	. . specially adapted to allow radial displacement, e.g. Oldham couplings
1/09	. . . with radial clamping due to axial loading of at least one pair of conical surfaces (tapered keys F16D 1/0882)}	3/06	. . specially adapted to allow axial displacement
2001/0903	. . . . {the clamped shaft being hollow}	3/065	. . . {by means of rolling elements}
2001/0906	. . . . {using a hydraulic fluid to clamp or disconnect, not provided for in F16D 1/091 }	3/08	. . Couplings for intersecting shafts, provided with intermediate bars bent in an angle corresponding with the angle of intersection
1/091	. . . . and comprising a chamber including a tapered piston moved axially by fluid pressure to effect clamping	3/10	. . Couplings with means for varying the angular relationship of two coaxial shafts during motion
1/092	. . . . the pair of conical mating surfaces being provided on the coupled hub and shaft	3/12	. . specially adapted for accumulation of energy to absorb shocks or vibration (by making use of fluid elements F16D 3/80)
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)	3/14	. . combined with a friction coupling for damping vibration or absorbing shock
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	3/16	. Universal joints in which flexibility is produced by means of pivots or sliding or rolling connecting parts
2001/0945	. . . . . {using multiple pairs of elastic or segmented rings to effect clamping}	3/18	. . the coupling parts (1) having slidably-interengaging teeth
1/095	. . . . . with clamping effected by ring contraction only (for connecting two abutting shafts F16D 1/02)}	3/185	. . . {radial teeth connecting concentric inner and outer coupling parts}
2001/0955	. . . . . {the clamping is effected by hub contraction, i.e. a compression of the hub instead of the ring}	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)
1/096	. . . . . the ring or rings being located between the shaft and the hub		NOTE
1/097	. . . . . with clamping effected by ring expansion only, e.g. with an expanded ring located between hub and shaft		"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 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
- 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

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	7/005	. {the torque being transmitted and limited by rolling friction, e.g. ball bearings axially loaded}
3/58	. . . the intermediate members being made of rubber or like material	7/007	. {the torque being transmitted and limited by rolling surfaces skidding, e.g. skew needle rollers}
3/60	. . comprising pushing or pulling links attached to both parts (F16D 3/64 takes precedence)	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 {, e.g. for friction overload clutches F16D 43/21})
3/62	. . . the links or their attachments being elastic	7/021	. . {with radially applied torque-limiting friction surfaces (F16D 7/022 takes precedence)}
3/64	. . comprising elastic elements arranged between substantially-radial walls of both coupling parts	7/022	. . {with a helical band or equivalent member co-operating with a cylindrical torque limiting coupling surface}
3/66	. . . the elements being metallic, e.g. in the form of coils	7/024	. . {with axially applied torque limiting friction surfaces}
3/68	. . . the elements being made of rubber or similar material	7/025	. . . {with flat clutching surfaces, e.g. discs}
3/70	. . comprising elastic elements arranged in holes in one coupling part and surrounding pins on the other coupling part	7/027	. . . . {with multiple lamellae}
3/72	. . with axially-spaced attachments to the coupling parts (F16D 3/56 takes precedence)	7/028	. . . {with conical friction surfaces}
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)}	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 43/202)}
3/74	. . . the intermediate member or members being made of rubber or other {rubber-like} flexible material	7/042	. . {with at least one part moving axially between engagement and disengagement (F16D 7/08 takes precedence)}
2003/745	. . . . {Tyre type coupling, i.e. bellows with only one fold}	7/044	. . . {the axially moving part being coaxial with the rotation, e.g. a gear with face teeth}
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	7/046	. . . {with a plurality of axially moving parts}
3/77	. . . the ring being metallic	7/048	. . {with parts moving radially between engagement and disengagement (F16D 7/10 takes precedence)}
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	7/06	. . with intermediate balls or rollers
3/79	. . . the disc or ring being metallic	7/08	. . . moving axially between engagement and disengagement
3/80	. in which a fluid is used (fluid couplings allowing continuous slip F16D 31/00 - F16D 35/00)	7/10	. . . moving radially between engagement and disengagement
3/82	. . with a coupling element in the form of a pneumatic tube (similar clutches F16D 25/04)	9/00	Couplings with safety member for disconnecting, e.g. breaking or melting member
3/84	. Shrouds, e.g. casings, covers; Sealing means specially adapted therefor	9/02	. by thermal means, e.g. melting member
3/841	. . {Open covers, e.g. guards for agricultural p.t.o. shafts}	9/04	. by tensile breaking
3/843	. . {enclosed covers}	9/06	. by breaking due to shear stress
3/845	. . . {allowing relative movement of joint parts due to the flexing of the cover}	9/08	. . over a single area encircling the axis of rotation, e.g. shear necks on shafts (F16D 9/10 takes precedence)
2003/846	. . . . {Venting arrangements for flexible seals, e.g. ventilation holes}	9/10	. . having a part movable after disconnection so as to provide reconnection, e.g. advanceable shear pins
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 (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}

- 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 expansible 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 disc 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)}
- 2013/581 . . . {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)

- 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}

- 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 synchromesh clutches}
- 2023/0687 {Clutches with electrical actuation}
- 2023/0693 {Clutches with hydraulic actuation}
- 23/08 . . with a blocking mechanism that only releases the clutching member on synchronisation (in combination with an additional friction clutch [F16D 23/06](#))
- 23/10 . . automatically producing the engagement of the clutch when the clutch members are moving at the same speed; Indicating synchronisation
- 23/12 . Mechanical clutch-actuating mechanisms arranged outside the clutch as such (specific for combined clutches [F16D 21/00](#); mechanisms specific for synchronisation [F16D 23/02](#))
- 2023/123 . . {Clutch actuation by cams, ramps or ball-screw mechanisms}
- 2023/126 . . {Actuation by rocker lever; Rocker levers therefor}
- 23/14 . . Clutch-actuating sleeves {or bearings}; Actuating members directly connected to clutch-actuating sleeves {or bearings}
- 2023/141 . . . {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})
- 2025/081 . . {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 Magnetically- {or electrically-} actuated clutches; Control or electric circuits therefor** (clutches with magnetisable particles [F16D 37/02](#); {with electro-rheological fluids [F16D 37/008](#)})
- 2027/001 . {Means for electric connection of the coils of the electromagnetic clutches}
- 2027/002 . {Electric or electronic circuits relating to actuation of electromagnetic clutches}

27/004	. {with permanent magnets combined with electromagnets}	33/00	Rotary fluid couplings or clutches of the hydrokinetic type
2027/005	. {Details relating to the internal construction of coils or to clutches having more than one coil in the same housing}	33/02	. controlled by changing the flow of the liquid in the working circuit, while maintaining a completely filled working circuit
2027/007	. {Bias of an armature of an electromagnetic clutch by flexing of substantially flat springs, e.g. leaf springs}	33/04	. . by altering the position of blades
2027/008	. {Details relating to the magnetic circuit, or to the shape of the clutch parts to achieve a certain magnetic path}	33/06	. controlled by changing the amount of liquid in the working circuit
27/01	. with permanent magnets	33/08	. . by devices incorporated in the fluid coupling, with or without remote control
27/02	. with electromagnets incorporated in the clutch, i.e. with collecting rings { (F16D 27/004 takes precedence) }	33/10	. . . consisting of controllable supply and discharge openings
27/025	. . {and with a helical band or equivalent member co-operating with a cylindrical coupling surface}	33/12	. . . . controlled automatically by self-actuated valves
27/04	. . with axially-movable friction surfaces	33/14	. . . consisting of shiftable or adjustable scoops
27/06	. . . with friction surfaces arranged within the flux	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)
27/08	. . . with friction surfaces arranged externally to the flux	33/18	. Details (applicable also to fluid gearing F16H 41/24)
27/09	. . and with interengaging jaws or gear-teeth	33/20	. . Shape of wheels, blades, or channels with respect to function
27/10	. with an electromagnet not rotating with a clutching member, i.e. without collecting rings { (F16D 27/004 takes precedence) }	35/00	Fluid clutches in which the clutching is predominantly obtained by fluid adhesion
27/102	. . with radially movable clutching members (F16D 27/105 takes precedence)	(F16D 37/00 takes precedence ; arrangements of viscous clutches in four-wheel drives - B60K 17/3465 and B60K 17/351)	
27/105	. . with a helical band or equivalent member co-operating with a cylindrical coupling surface	35/005	. {with multiple lamellae}
27/108	. . with axially movable clutching members	35/02	. with rotary working chambers and rotary reservoirs, e.g. in one coupling part
27/11	. . . with conical friction surfaces, e.g. cone clutches	35/021	. . {actuated by valves}
27/112	. . . with flat friction surfaces, e.g. discs	35/022	. . . {the valve being actuated by a bimetallic strip (F16D 35/026 takes precedence)}
27/115	. . . . with more than two discs, e.g. multiple lamellae	35/023	. . . {the valve being actuated by a bimetallic coil (F16D 35/026 takes precedence)}
27/118	. . with interengaging jaws or gear teeth	35/024	. . . {the valve being actuated electrically, e.g. by an electromagnet (F16D 35/026 takes precedence)}
27/12	. Clutch systems with a plurality of electro-magnetically-actuated clutches { (F16D 27/004 takes precedence) }	35/025	. . . {the valve being actuated by inertia, e.g. using a flyweight or a centrifugal mass (F16D 35/026 takes precedence)}
27/14	. Details	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 }
28/00	Electrically-actuated clutches (arrangements for synchronisation F16D 23/02 ; clutches actuated directly by means of an electromagnet F16D 27/00 ; automatic clutches F16D 43/00 - F16D 45/00 ; external control F16D 48/00)	35/027	. . {actuated by emptying and filling with viscous fluid from outside the coupling during operation}
29/00	Clutches and systems of clutches involving both fluid and magnetic actuation	35/028	. . {actuated electrically, e.g. by an electromagnet (valves actuated electrically F16D 35/024)}
29/005	. {with a fluid pressure piston driven by an electric motor}	35/029	. . {actuated by varying the volume of the reservoir chamber}
<u>Couplings or clutches with a fluid or a semi-fluid as a power-transmitting means</u> (fluid gearing F16H 39/00 - F16H 49/00)		37/00	Clutches in which the drive is transmitted through a medium consisting of small particles, e.g. centrifugally speed-responsive
31/00	Fluid couplings or clutches with pumping sets of the volumetric type, i.e. in the case of liquid passing a predetermined volume per revolution	2037/001	. {Electric arrangements for clutch control}
31/02	. using pumps with pistons or plungers working in cylinders	2037/002	. {characterised by a single substantially axial gap in which the fluid or medium consisting of small particles is arranged}
31/04	. using gear-pumps	2037/004	. {characterised by multiple substantially axial gaps in which the fluid or medium consisting of small particles is arranged}
31/06	. using pumps of types differing from those before-mentioned		
31/08	. Control of slip		

2037/005	. {characterised by a single substantially radial gap in which the fluid or medium consisting of small particles is arranged}	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}
2037/007	. {characterised by multiple substantially radial gaps in which the fluid or medium consisting of small particles is arranged}		
37/008	. {the particles being carried by a fluid, to vary viscosity when subjected to electric change, i.e. electro-rheological or smart fluids (composition of such fluids C10M 171/001)}	41/08	. . with provision for altering the freewheeling action
37/02	. the particles being magnetisable	41/082	. . . {the intermediate coupling members wedging by movement other than pivoting or rolling}
39/00	Combinations of couplings according to two or more of the groups F16D 31/00 - F16D 37/00	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)}
Freewheels or freewheel clutches; Automatic clutches (F16D 31/00 - F16D 39/00 take 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}
41/00	Freewheels or freewheel clutches (cycle brakes controlled by back-peddalling B62L 5/00 {; one-way linear clutches F16B 2007/16})	41/10	. . . with self-actuated reversing
41/02	. disengaged by contact of a part of or on the freewheel or freewheel clutch with a stationarily-mounted member	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}
41/04	. combined with a clutch for locking the driving and driven members (F16D 41/02, F16D 41/24 take precedence)	41/12	. with hinged pawl co-operating with teeth, cogs, or the like (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)	41/125	. . {the pawl movement having an axial component}
2041/0601	. . {with a sliding bearing or spacer}	41/14	. . the effective stroke of the pawl being adjustable
2041/0603	. . {Sprag details}	41/16	. . the action being reversible
2041/0605	. . {Spring details}	41/18	. with non-hinged detent (F16D 41/02, F16D 41/24 take precedence)
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}	41/185	. . {the engaging movement having an axial component}
2041/0608	. . {Races with a regular polygon shape}	41/20	. with expandable or contractable clamping ring or band (F16D 41/02, F16D 41/24 take precedence)
41/061	. . the intermediate members wedging by movement having an axial component	41/203	. . {having coils overlapping in a single radial plane, e.g. Archimedian spiral}
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)	41/206	. . {having axially adjacent coils, e.g. helical wrap-springs}
41/064	. . the intermediate members wedging by rolling and having a circular cross-section, e.g. balls (F16D 41/061 takes precedence)	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)
2041/0643	. . . {the intermediate coupling members being of more than one size}	41/24	. specially adapted for cycles
2041/0646	. . . {the intermediate coupling members moving between recesses in an inner race and recesses in an outer race}	41/26	. . with provision for altering the action
41/066	. . . all members having the same size and only one of the two surfaces being cylindrical	41/28	. . with intermediate wedging coupling members
2041/0665	. . . . {characterised by there being no cage other than the inner and outer race for distributing the intermediate members}	41/30	. . with hinged pawl co-operating with teeth, cogs, or the like
41/067	. . . . and the members being distributed by a separate cage encircling the axis of rotation	41/32	. . with non-hinged detent
41/069	. . the intermediate members wedging by pivoting or rocking, e.g. sprags (F16D 41/061 takes precedence)	41/34	. . with expandable or contractable clamping ring or band
41/07	. . . between two cylindrical surfaces	41/36	. . with clutching ring or disc axially shifted as a result of lost motion between actuating members
41/073	. . . . {each member comprising at least two elements at different radii}	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 actuating axially a movable pressure ring or the like

- 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 41/26](#))
- 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**
- WARNING**
- Groups [F16D 48/00](#), [F16D 48/06](#), [F16D 48/08](#), [F16D 48/10](#), introduced in September 1998, are not complete. Documents from the groups [F16D 48/062](#) - [F16D 48/066](#) are in the process of being reorganised to [F16D 48/00](#), [F16D 48/08](#), [F16D 48/10](#)
- 48/02 . . Control by fluid pressure
- 2048/0203 . . . {with an accumulator; Details thereof}
- 48/0206 . . . {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}
- 2048/0257 {Hydraulic circuit layouts, i.e. details of hydraulic circuit elements or the arrangement thereof}
- 2048/026 {The controlling actuation is directly performed by the pressure source, i.e. there is no intermediate valve for controlling flow or pressure}
- 2048/0263 {Passive valves between pressure source and actuating cylinder, e.g. check valves or throttle valves}
- 2048/0266 {Actively controlled valves between pressure source and actuation cylinder}
- 2048/0269 {Single valve for switching between fluid supply to actuation cylinder or draining to the sump}
- 2048/0272 {Two valves, where one valve is supplying fluid to the cylinder and the other valve is for draining fluid to the sump}
- 2048/0275 {Two valves arranged in parallel, e.g. one for coarse and the other for fine control during supplying or draining fluid from the actuation cylinder}
- 2048/0278 {Two valves in series arrangement for controlling supply to actuation cylinder}
- 2048/0281 {Complex circuits with more than two valves in series or special arrangements thereof not provided for in previous groups}
- 2048/0284 {characterised by valve arrangements supplying fluid to a two chamber- cylinder}
- 2048/0287 {Hydraulic circuits combining clutch actuation and other hydraulic systems}
- 2048/029 {Hydraulic circuits combining clutch actuation with clutch lubrication or cooling}
- 2048/0293 {Hydraulic circuits combining clutch and transmission actuation}
- 2048/0296 {Hydraulic circuits controlled exclusively by hydraulic pressure, i.e. with no electrically controlled valves}
- 48/04 providing power assistance
- 2048/045 {Vacuum boosters therefor}
- 48/06 Control by electric or electronic means, e.g. of fluid pressure
- 48/062 {of a clutch system with a plurality of fluid actuated clutches}
- 48/064 {Control of electrically or electromagnetically actuated clutches ([F16D 48/062](#), [F16D 48/068 take precedence](#))}
- 48/066 {Control of fluid pressure, e.g. using an accumulator ([F16D 48/062](#), [F16D 48/068 take precedence](#))}
- 48/068 {using signals from a manually actuated gearshift linkage}
- 48/08 Regulating clutch take-up on starting
- 48/10 Preventing unintentional or unsafe engagement

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
- 51/54 . . with three or more brake-shoes, at least two of them being linked or directly interacting
- 51/56 mechanically actuated
- 51/58 fluid actuated
- 51/60 . . with wedging action of a brake-shoe, e.g. the shoe entering as a wedge between the brake-drum and a stationary part
- 51/62 mechanically actuated
- 51/64 fluid actuated
- 51/66 . . an actuated brake-shoe being carried along and thereby engaging a member for actuating another brake-shoe
- 51/68 mechanically actuated
- 51/70 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}
- 2055/0008 . . {Brake supports}
- 2055/0012 . . . {integral with vehicle suspension}
- 2055/0016 . . {Brake calipers}
- 2055/002 . . . {assembled from a plurality of parts}
- 2055/0025 . . . {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}
- 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 coating 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 leverage
- 55/32 actuated by a fluid-pressure device arranged in or on the brake
- 55/33 by means of an intermediate leverage
- 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 leverage
- 55/40 actuated by a fluid-pressure device arranged in or one the brake
- 55/41 by means of an intermediate leverage
- 55/42 comprising an expansible fluid-filled flexible member coaxial with the brake
- 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}
- 65/0081 . . {Brake covers}
- 65/0087 . . {Brake housing guide members, e.g. caliper pins; Accessories therefor, e.g. dust boots}
- 65/0093 . . {Brake housing guide members, e.g. caliper pins; Accessories therefor, e.g. dust boots}
- 65/02 . Braking members; Mounting thereof ([friction linings or attachment thereof F16D 69/00](#))
- 2065/022 . . {Rollers}
- 2065/024 . . {the braking surface being inclined with respect to the rotor's axis of rotation at an angle other than 90 degrees, e.g. comprising a conical rotor}
- 2065/026 . . {characterised by a particular outline shape of the braking member, e.g. footprint of friction lining}
- 65/028 . . {Rollers}
- 65/04 . . Bands, shoes or pads; Pivots or supporting members therefor
- 65/06 . . . for externally-engaging brakes
- 65/062 {engaging the tread of a railway wheel}
- 65/065 {Brake bands}
- 65/067 {with means for mounting, e.g. end connection members}
- 65/08 . . . for internally-engaging brakes
- 65/09 Pivots or supporting members therefor
- 65/091 {for axially holding the segments}
- 65/092 . . . for axially-engaging brakes, e.g. disc brakes
- 65/095 Pivots or supporting members therefor
- 65/097 Resilient means interposed between pads and supporting members {or other brake parts}
- 65/0971 {transmitting brake actuation force, e.g. elements interposed between brake piston and pad}
- 65/0972 {transmitting brake reaction force, e.g. elements interposed between torque support plate and pad}
- 65/0973 {not subjected to brake forces}
- 65/0974 {acting on or in the vicinity of the pad rim in a direction substantially transverse to the brake disc axis}
- 65/0975 {Springs made from wire}
- 65/0976 {acting on one pad only}
- 65/0977 {Springs made from sheet metal}
- 65/0978 {acting on one pad only}
- 65/0979 {acting on the rear side of the pad or an element affixed thereto, e.g. spring clips securing the pad to the brake piston or caliper}
- 65/10 . . Drums for externally- or internally-engaging brakes
- 65/12 . . Discs; Drums for disc brakes
- 65/121 . . . {consisting of at least three circumferentially arranged segments}
- 65/122 . . . {adapted for mounting of friction pads}
- 65/123 . . . {comprising an annular disc secured to a hub member; Discs characterised by means for mounting}

65/124	. . . . {adapted for mounting on the wheel of a railway vehicle}	65/42	. . . non-automatic
65/125	. . . {characterised by the material used for the disc body}	65/44	. . . . by means of direct linear adjustment
65/126	. . . . {the material being of low mechanical strength, e.g. carbon, beryllium; Torque transmitting members therefor}	65/46	. . . . with screw-thread and nut
65/127	. . . {characterised by properties of the disc surface; Discs lined with friction material}	65/48	. . . . with eccentric or helical body
65/128	. . . {characterised by means for cooling}	65/50	. . . . for angular adjustment of two concentric parts of the brake control system
2065/13	. . {Parts or details of discs or drums}	65/52	. . . self-acting in one direction for adjusting excessive play
2065/1304	. . . {Structure}	65/54	. . . . by means of direct linear adjustment
2065/1308	. . . . {one-part}	65/543	. . . . . {comprising a plastically-deformable member}
2065/1312	. . . . {circumferentially segmented}	65/546	. . . . . {for mounting within the confines of a drum brake}
2065/1316	. . . . {radially segmented}	65/56	. . . . with screw-thread and nut
2065/132	. . . . {layered}	65/561	. . . . . {for mounting within the confines of a drum brake}
2065/1324	. . . . {carrying friction elements}	65/562	. . . . . {arranged between service brake actuator and braking member, and subjected to service brake force}
2065/1328	. . . . {internal cavities, e.g. cooling channels}	65/563	. . . . . {arranged adjacent to service brake actuator, e.g. on parking brake lever, and not subjected to service brake force}
2065/1332	. . . . {external ribs, e.g. for cooling or reinforcement}	65/565	. . . . . {arranged diametrically opposite to service brake actuator, and subjected to service brake force}
2065/1336	. . . . {integral part of vehicle wheel}	65/566	. . . . . {having a temperature-sensitive element preventing adjustment when brake is hot}
2065/134	. . . {Connection}	65/567	. . . . . {for mounting on a disc brake}
2065/1344	. . . . {permanent, e.g. by casting}	65/568	. . . . . {for synchronous adjustment of actuators arranged in parallel}
2065/1348	. . . . {resilient}	65/58	. . . . with eccentric or helical body
2065/1352	. . . . {articulated}	65/60	. . . . for angular adjustment of two concentric parts of the brake control systems
2065/1356	. . . . {interlocking}	65/62	. . . self-acting in both directions for adjusting excessive and insufficient play
2065/136	. . . . . {with relative movement radially}	65/64	. . . . by means of direct linear adjustment
2065/1364	. . . . . {with relative movement axially}	65/66	. . . . with screw-thread and nut
2065/1368	. . . . . {with relative movement both radially and axially}	65/68	. . . . with eccentric or helical body
2065/1372	. . . . {outer circumference}	65/70	. . . . for angular adjustment of two concentric parts of the brake control system
2065/1376	. . . . {inner circumference}	65/72	. . hydraulic
2065/138	. . . . {to wheel}	65/74	. . . self-acting in one direction
2065/1384	. . . . {to wheel hub}	65/76	. . . self-acting in both directions
2065/1388	. . . . {to shaft or axle}	65/78	. Features relating to cooling
2065/1392	. . . . {Connection elements}	2065/781	. . {involving phase change of material}
2065/1396	. . . . . {Ancillary resilient elements, e.g. anti-rattle or retraction springs}	2065/782	. . {the brake-actuating fluid being used as a coolant}
65/14	. Actuating mechanisms for brakes; Means for initiating operation at a predetermined position (brake control systems, parts thereof B60T)	2065/783	. . {cooling control or adjustment}
	NOTE	2065/784	. . {the coolant not being in direct contact with the braking surface}
	In this group, it is desirable to add the indexing codes of groups F16D 2121/00 - F16D 2131/00 relating to actuators.	2065/785	. . {Heat insulation or reflection}
65/16	. . arranged in or on the brake	2065/786	. . {Fluid spray devices}
65/18	. . . adapted for drawing members together {, e.g. for disc brakes}	2065/787	. . {Pumps}
65/183	. . . . {with force-transmitting members arranged side by side acting on a spot type force-applying member}	2065/788	. . {Internal cooling channels}
65/186	. . . . {with full-face force-applying member, e.g. annular}	2065/789	. . {External cooling ribs}
65/22	. . . adapted for pressing members apart {, e.g. for drum brakes}	65/80	. . for externally-engaging brakes
65/28	. . arranged apart from the brake	65/807	. . . with open cooling system, e.g. cooled by air
65/38	. Slack adjusters	65/813	. . . with closed cooling system
2065/383	. . {for adjusting the spring force in spring-applied brakes}	65/82	. . for internally-engaging brakes
2065/386	. . {driven electrically}	65/827	. . . with open cooling system, e.g. cooled by air
65/40	. . mechanical	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**
- 2066/001 . {Temperature}
- 2066/003 . {Position, angle or speed}
- 2066/005 . {Force, torque, stress or strain}
- 2066/006 . {without direct measurement of the quantity monitored, e.g. wear or temperature calculated from force and duration of braking}
- 2066/008 . {of clutches}
- 66/02 . Apparatus for indicating wear
- 66/021 . . {using electrical detection or indication means}
- 66/022 . . . {indicating that a lining is worn to minimum allowable thickness}
- 66/023 {directly sensing the position of braking members}
- 66/024 {Sensors mounted on braking members adapted to contact the brake disc or drum, e.g. wire loops severed on contact}
- 66/025 {sensing the position of parts of the brake system other than the braking members, e.g. limit switches mounted on master cylinders}
- 66/026 . . . {indicating different degrees of lining wear}
- 66/027 {Sensors therefor}
- 66/028 . . . {with non-electrical sensors or signal transmission, e.g. magnetic, optical}
- 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 coating 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}
- 2069/0466 {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** [\(combined with or controlling clutches F16D 43/26; means for initiating operation of brakes at a predetermined position F16D 65/14; means for securing members after operation F16B 1/02\)](#)
- 71/02 . comprising auxiliary means for producing the final movement
- 71/04 . providing for selection between a plurality of positions [\(F16D 71/02 takes precedence\)](#)
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- 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 ball-ramp mechanisms arranged concentrically with the brake rotor axis
- 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}
- 2127/02 . 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 wedging 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
- 2250/0061 . Joining
- 2250/0069 . . Adhesive bonding
- 2250/0076 . . Welding, brazing
- 2250/0084 . Assembly or disassembly
- 2250/0092 . Tools or machines for producing linings

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
- 2500/1064 . . . Electric
- 2500/1066 . . . Hybrid
- 2500/1068 . . . Engine supercharger or turbocharger
- 2500/108 . . Gear
- 2500/1081 . . . Actuation type
- 2500/1082 Manual transmission
- 2500/1083 Automated manual transmission
- 2500/1085 Automatic transmission
- 2500/1086 . . . Concentric shafts
- 2500/1087 . . . Planetary gearing
- 2500/1088 . . . CVT
- 2500/11 . . Application
- 2500/1102 . . . Lawnmower
- 2500/1105 . . . Marine applications
- 2500/1107 . . . Vehicles
- 2500/111 Agricultural
- 2500/1112 Heavy vehicle
- 2500/1115 Racing
- 2500/1117 Motorcycle
- 2500/112 . . Details of the arrangement of the system
- 2500/30 . Signal inputs
- 2500/302 . . from the actuator
- 2500/3021 . . . Angle
- 2500/3022 . . . Current
- 2500/3023 . . . Force
- 2500/3024 . . . Pressure
- 2500/3025 . . . Fluid flow
- 2500/3026 . . . Stroke
- 2500/3027 . . . Torque
- 2500/3028 . . . Voltage
- 2500/304 . . from the clutch
- 2500/30401 . . . On-off signal indicating the engage or disengaged position of the clutch
- 2500/30402 . . . Clutch friction coefficient
- 2500/30403 . . . Number of clutch actuations
- 2500/30404 . . . Clutch temperature
- 2500/30405 Estimated clutch temperature
- 2500/30406 . . . Clutch slip
- 2500/30407 Clutch slip change rate
- 2500/30408 . . . Relative rotational position of the input and output parts, e.g. for facilitating positive clutch engagement
- 2500/30409 Signals detecting the transmission of zero torque
- 2500/3041 . . . from the input shaft
- 2500/30412 Torque of the input shaft
- 2500/30415 Speed of the input shaft
- 2500/30417 Speed change rate of the input shaft
- 2500/3042 . . . from the output shaft
- 2500/30421 Torque of the output shaft
- 2500/30423 Signal detecting the transmission of zero torque

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2500/30425	Estimation of the transmitted clutch torque, e.g. applying dynamic torque balance equation	2500/3122	Ambient temperature
2500/30426	. . . . .	Speed of the output shaft	2500/3124	. . . . .	Driving conditions, e.g. climbing hills, cornering, traffic
2500/30428	. . . . .	Speed change rate of the output shaft	2500/3125	. . . . .	Driving resistance, i.e. external factors having an influence in the traction force, e.g. road friction, air resistance, road slope
2500/305	. . . . .	from the clutch cooling	2500/3127	. . . . .	Road slope
2500/3051	. . . . .	Flow amount of cooling fluid	2500/3128	. . . . .	Distance from the vehicle to an external element, e.g. to an obstacle, to an other vehicle or a target
2500/3053	. . . . .	On/off signal indicating the presence of cooling oil flow	2500/314	. . . . .	from the user
2500/3055	. . . . .	Cooling oil properties	2500/31406	. . . . .	input from pedals
2500/3056	. . . . .	Cooling oil temperature	2500/31413	. . . . .	Clutch pedal position
2500/3058	. . . . .	Cooling oil pressure	2500/3142	. . . . .	Clutch pedal position rate
2500/306	. . . . .	from the engine	2500/31426	. . . . .	Brake pedal position
2500/3061	. . . . .	Engine inlet air flow rate	2500/31433	. . . . .	Brake pedal position threshold, e.g. switch
2500/3062	. . . . .	Engine braking signal indicating the use of the engine as a brake	2500/3144	. . . . .	Accelerator pedal position
2500/3063	. . . . .	Engine fuel flow rate	2500/31446	. . . . .	Accelerator pedal position change rate
2500/3064	. . . . .	Temperature of the engine	2500/31453	. . . . .	Accelerator pedal position threshold, e.g. switch
2500/3065	. . . . .	Torque of the engine	2500/3146	. . . . .	input from levers
2500/3066	. . . . .	Torque change rate of the engine	2500/31466	. . . . .	Gear lever
2500/3067	. . . . .	Speed of the engine	2500/31473	. . . . .	Parking brake lever
2500/3068	. . . . .	Speed change of rate of the engine	2500/3148	. . . . .	Detection of user presence
2500/3069	. . . . .	Engine ignition switch	2500/31486	. . . . .	Recognition of user style of driving, e.g. sportive, calm, nervous
2500/308	. . . . .	from the transmission	2500/31493	. . . . .	Switches on the dashboard
2500/30801	. . . . .	Number of shift actuations	2500/316	. . . . .	Other signal inputs not covered by the groups above
2500/30802	. . . . .	Transmission oil properties	2500/3161	. . . . .	Signal providing information about the state of engine accessories
2500/30803	. . . . .	Oil temperature	2500/3163	. . . . .	Using the natural frequency of a component as input for the control
2500/30805	. . . . .	Oil pressure	2500/3165	. . . . .	Using the moment of inertia of a component as input for the control
2500/30806	. . . . .	Engaged transmission ratio	2500/3166	. . . . .	Detection of an elapsed period of time
2500/30807	. . . . .	Estimation of the engaged transmission ratio	2500/3168	. . . . .	Temperature detection of any component of the control system
2500/30808	. . . . .	Detection of transmission in neutral	2500/50	. . . . .	Problem to be solved by the control system
2500/3081	. . . . .	from the input shaft	2500/501	. . . . .	Relating the actuator
2500/30812	. . . . .	Direction of rotation of the input shaft	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
2500/30814	. . . . .	Torque of the input shaft	2500/5014	. . . . .	Filling the actuator cylinder with fluid
2500/30816	. . . . .	Speed of the input shaft	2500/5016	. . . . .	Shifting operation, i.e. volume compensation of the master cylinder due to wear, temperature changes or leaks in the cylinder
2500/30818	. . . . .	Speed change rate of the input shaft	2500/5018	. . . . .	Calibration or recalibration of the actuator
2500/3082	. . . . .	from the output shaft	2500/502	. . . . .	Relating the clutch
2500/30822	. . . . .	Torque of the output shaft	2500/50203	. . . . .	Transition between manual and automatic control of the clutch
2500/30825	. . . . .	Speed of the output shaft	2500/50206	. . . . .	Creep control
2500/30827	. . . . .	Speed change rate of the output shaft	2500/50209	. . . . .	Activation of the creep control operation
2500/31	. . . . .	from the vehicle	2500/50212	. . . . .	Accelerator pedal
2500/3101	. . . . .	Detection of a brake actuation by a sensor on the brake (brake pedal actuation F16D 2500/31426)	2500/50215	. . . . .	Brake pedal
2500/3102	. . . . .	Vehicle direction of travel, i.e. forward/reverse	2500/50218	. . . . .	Clutch pedal
2500/3104	. . . . .	Travelled distance	2500/50221	. . . . .	Manual switch actuated by the user
2500/3105	. . . . .	Operational Time of clutches during vehicle life	2500/50224	. . . . .	Drive-off
2500/3107	. . . . .	Vehicle weight	2500/50227	. . . . .	Control of clutch to control engine
2500/3108	. . . . .	Vehicle speed	2500/5023	. . . . .	Determination of the clutch wear
2500/3109	. . . . .	Vehicle acceleration	2500/50233	. . . . .	Clutch wear adjustment operation
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			

- 2500/50236 . . . 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
 - 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
- 2500/506 . . 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
- 2500/51 . . 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
 - 2500/511 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 ([F16D 2500/50248 takes precedence](#))
- 2500/5118 . . . Maintenance
- 2500/512 . . Relating to the driver
 - 2500/5122 . . . Improve passengers comfort
 - 2500/5124 . . . Driver error, i.e. preventing effects of unintended or incorrect driver inputs
- 2500/5126 . . . Improving response to driver inputs
- 2500/5128 . . . Driver workload reduction
- 2500/52 . . General
 - 2500/525 . . . Improve response of control system
 - 2500/70 . . 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

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2500/70264	Stroke	2500/7061	Feed-back
2500/7027	Engine speed	2500/70615	PI control
2500/70276	Slip	2500/70621	PD control
2500/70282	Time	2500/70626	PID control
2500/70288	Clutch pedal position	2500/70631	Feed-forward
2500/70294	Valve look-up tables	2500/70636	Fuzzy logic
2500/704	Output parameters from the control unit; Target parameters to be controlled	2500/70642	Inverse model
2500/70402	Actuator parameters	2500/70647	Neuronal network
2500/70404	Force	2500/70652	Open loop
2500/70406	Pressure	2500/70657	Predictor methods
2500/70408	Torque	2500/70663	State analysis; Analysing potential states of the machine and developing control strategies at each state
2500/7041	Position	2500/70668	Signal filtering
2500/70412	Clutch position change rate	2500/70673	Statistical calculations
2500/70414	Quick displacement to clutch touch point	2500/70678	using histograms
2500/70416	Angle	2500/70684	using regressions
2500/70418	Current	2500/70689	using maximum or minimum values
2500/7042	Voltage	2500/70694	with plausibility checks
2500/70422	Clutch parameters	2500/708	Mathematical model
2500/70424	Outputting a clutch engaged-disengaged signal	2500/7082	of the clutch
2500/70426	Clutch slip	2500/7085	of the driver
2500/70428	Clutch slip change rate	2500/7087	of the vehicle
2500/7043	Clutch temperature	2500/71	Actions
2500/70432	From the input shaft	2500/7101	Driver alarm
2500/70434	Input shaft torque	2500/7102	by provoking vibrations of a vehicle part
2500/70436	Input shaft speed	2500/7103	Acoustic alarms
2500/70438	From the output shaft	2500/7104	Visual alarms
2500/7044	Output shaft torque	2500/7105	Inhibit control automatically
2500/70442	Output shaft speed	2500/7106	Gearshift to neutral
2500/70444	Output shaft speed rate	2500/7107	Others
2500/70446	Clutch cooling parameters	2500/7108	Engine torque calculation
2500/70448	for regulating the amount of fluid flow	2500/7109	Pulsed signal; Generating or processing pulsed signals; PWM, width modulation, frequency or amplitude modulation
2500/7045	On/off switching of the cooling fluid flow		
2500/70452	Engine parameters		
2500/70454	Engine speed		
2500/70456	Engine speed change rate		
2500/70458	Engine torque		
2500/7046	Engine torque change rate		
2500/70462	Opening of the throttle valve		
2500/70464	Transmission parameters		
2500/70466	Input shaft		
2500/70468	Input shaft torque		
2500/7047	Input shaft torque change rate		
2500/70472	Input shaft speed		
2500/70474	Input shaft speed change rate		
2500/70476	Output shaft		
2500/70478	Output shaft power		
2500/7048	Output shaft torque		
2500/70482	Output shaft torque change rate		
2500/70484	Output shaft speed		
2500/70486	Output shaft speed change rate		
2500/70488	Selection of the gear ratio		
2500/7049	Brake parameters		
2500/70492	Vehicle parameters		
2500/70494	Vehicle speed		
2500/70496	Vehicle acceleration		
2500/70498	Vehicle acceleration change rate		
2500/706	Strategy of control		
2500/70605	Adaptive correction; Modifying control system parameters, e.g. gains, constants, look-up tables		