

# CPC COOPERATIVE PATENT CLASSIFICATION

## F16D COUPLINGS FOR TRANSMITTING ROTATION; CLUTCHES; BRAKES

### NOTE

Attention is drawn to the following places:

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

### WARNING

The following IPC groups are not used in the CPC scheme. Subject matter covered by these groups is classified in the following CPC groups:

<a href="#">F16D 3/19</a>	covered by	<a href="#">F16D 3/50</a> ;
<a href="#">F16D 3/27</a>	covered by	<a href="#">F16D 3/265</a> ;
<a href="#">F16D 27/07</a>	covered by	<a href="#">F16D 27/06</a> , <a href="#">F16D 27/14</a> ;
<a href="#">F16D 48/12</a>	covered by	<a href="#">B60K 23/0808</a> ;
<a href="#">F16D 65/35</a>	covered by	<a href="#">F16D 63/00</a> .

**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](#))

<b>1/00</b>	<b>Couplings for rigidly connecting two coaxial shafts or other movable machine elements</b> (attachment of wheels to axles for railway carriages <a href="#">B60B</a> ; for attachment of cranks to their shafts <a href="#">F16C 3/10</a> )
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 <a href="#">B63H 23/34</a> )
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 <a href="#">F16D 1/068</a> )
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 ( <a href="#">F16D 1/091</a> takes precedence; elastic couplings <a href="#">F16D 3/80</a> ; fluid pressure clutches <a href="#">F16D 25/04</a> )}
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 <a href="#">F16D 17/00</a> ; similar free-wheel clutches <a href="#">F16D 41/06</a> )}
1/0823	. . . {with radial clamping of a helical wrap spring on the shaft or in the hub bore (similar clutches <a href="#">F16D 13/025</a> , <a href="#">F16D 13/08</a> , <a href="#">F16D 27/025</a> , <a href="#">F16D 27/105</a> ; similar slip couplings <a href="#">F16D 7/022</a> ; similar free-wheel clutches <a href="#">F16D 41/206</a> )}
1/0829	. . . {with radial loading of both hub and shaft by an intermediate ring or sleeve ( <a href="#">F16D 1/0817</a> , <a href="#">F16D 1/0823</a> , <a href="#">F16D 1/093</a> take precedence)}
1/0835	. . . . {due to the elasticity of the ring or sleeve}
1/0841	. . . . {due to axial loading of the ring or sleeve, e.g. Belleville washers}
1/0847	. . . {with radial clamping due to a radial screw}
1/0852	. . . {with radial clamping between the mating surfaces of the hub and shaft ( <a href="#">F16D 1/0805</a> - <a href="#">F16D 1/0817</a> , <a href="#">F16D 1/09</a> take precedence)}
1/0858	. . . . {due to the elasticity of the hub (including shrink fits)}
1/0864	. . . . {due to tangential loading of the hub, e.g. a split hub}

1/087	. . . . {due to other loading elements in the hub or shaft}	3/00	<b>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)</b>
1/0876	. . . {with axial keys and no other radial clamping}	3/005	. {incorporating leaf springs, flexible parts of reduced thickness or the like acting as pivots}
1/0882	. . . . {the key being axially tapered and tightening when loaded axially}	3/02	. adapted to specific functions (universal joints, see the appropriate groups)
1/0888	. . . . . {the key having two axially tapered interengaging parts}	3/04	. . specially adapted to allow radial displacement, e.g. Oldham coupling
1/0894	. . . {with other than axial keys, e.g. diametral pins, cotter pins and no other radial clamping}	3/06	. . specially adapted to allow axial displacement
1/09	. . . with radial clamping due to axial loading of at least one pair of conical surfaces ({tapered keys F16D 1/0882})	3/065	. . . {by means of rolling elements}
2001/0903	. . . . {the clamped shaft being hollow}	3/08	. . Couplings for intersecting shafts, provided with intermediate bars bent in an angle corresponding with the angle of intersection
2001/0906	. . . . {using a hydraulic fluid to clamp or disconnect, not provided for in F16D 1/091}	3/10	. . Couplings with means for varying the angular relationship of two coaxial shafts during motion
1/091	. . . . and comprising a chamber including a tapered piston moved axially by fluid pressure to effect clamping	3/12	. . specially adapted for accumulation of energy to absorb shocks or vibration (by making use of fluid elements F16D 3/80)
1/092	. . . . the pair of conical mating surfaces being provided on the coupled hub and shaft	3/14	. . combined with a friction coupling for damping vibration or absorbing shock
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)	3/16	. Universal joints in which flexibility is produced by means of pivots or sliding or rolling connecting parts
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	3/18	. . the coupling parts (1) having slidably-interengaging teeth
2001/0945	. . . . . {using multiple pairs of elastic or segmented rings to effect clamping}	3/185	. . . {radial teeth connecting concentric inner and outer coupling parts}
1/095	. . . . . with clamping effected by ring contraction only ({for connecting two abutting shafts F16D 1/02})	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)
2001/0955	. . . . . {the clamping is effected by hub contraction, i.e. a compression of the hub instead of the ring}		<b>NOTE</b>
1/096	. . . . . the ring or rings being located between the shaft and the hub		"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.
1/097	. . . . . with clamping effected by ring expansion only, e.g. with an expanded ring located between hub and shaft	3/202	. . . one coupling part having radially projecting pins, e.g. tripod joints
1/10	. Quick-acting couplings in which the parts are connected by simply bringing them together axially	2003/2023	. . . . {with linear rolling bearings between raceway and trunnion mounted shoes}
1/101	. . {without axial retaining means rotating with the coupling}	2003/2026	. . . . {with trunnion rings, i.e. with tripod joints having rollers supported by a ring on the trunnion}
2001/102	. . {the torque is transmitted via polygon shaped connections}	3/205	. . . . the pins extending radially outwardly from the coupling part
2001/103	. . {the torque is transmitted via splined connections}	3/2052	. . . . . {having two pins}
1/104	. . having retaining means rotating with the coupling and acting only by friction	3/2055	. . . . . {having three pins, i.e. true tripod joints}
1/108	. . having retaining means rotating with the coupling and acting by interengaging parts, i.e. positive coupling	3/2057	. . . . . {having four or more pins, e.g. with compensation for relative pin movement}
1/112	. . . the interengaging parts comprising torque-transmitting surfaces, e.g. bayonet joints	3/207	. . . . the pins extending radially inwardly from the coupling part
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)	3/22	. . . the rolling members being balls, rollers, or the like, guided in grooves or sockets in both coupling parts
1/12	. allowing adjustment of the parts about the axis (during motion F16D 3/10)	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}	3/38	. . . . .	with a single intermediate member with trunnions or bearings arranged on two axes perpendicular to one another ( <a href="#">F16D 3/36 takes precedence</a> )
2003/22306	. . . . .	{having counter tracks, i.e. ball track surfaces which diverge in opposite directions}	3/382	. . . . .	{constructional details of other than the intermediate member}
2003/22309	. . . . .	{Details of grooves}	3/385	. . . . .	{Bearing cup; Bearing construction; Bearing seal; Mounting of bearing on the intermediate member ( <a href="#">mounting of bearing in fork F16D 3/382</a> )}
2003/22313	. . . . .	{Details of the inner part of the core or means for attachment of the core on the shaft}	3/387	. . . . .	{Fork construction; Mounting of fork on shaft; Adapting shaft for mounting of fork}
2003/22316	. . . . .	{Means for fastening or attaching the bellows or gaiters}	3/40	. . . . .	with intermediate member provided with two pairs of outwardly-directed trunnions on intersecting axes
2003/2232	. . . . .	{Elements arranged in the hollow space between the end of the inner shaft and the outer joint member}	3/405	. . . . .	{Apparatus for assembling or dismantling}
2003/22323	. . . . .	{Attachments to the shaft of the inner joint member whereby the attachments are distanced from the core}	3/41	. . . . .	with ball or roller bearings
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}	3/42	. . . . .	with ring-shaped intermediate member provided with bearings or inwardly-directed trunnions
3/2233	. . . . .	where the track is made up of two curves with a point of inflexion in between, i.e. S-track joints	3/43	. . . . .	with ball or roller bearings
3/2237	. . . . .	where the grooves are composed of radii and adjoining straight lines, i.e. undercut free [UF] type joints	3/44	. . . . .	the intermediate member being connected to the coupling parts by ridges, pins, balls, or the like guided in grooves or between cogs
3/224	. . . . .	the groove centre-lines in each coupling part lying on a sphere	3/46	. . . . .	each coupling part embracing grooves or ridges on the intermediate member
3/2245	. . . . .	where the groove centres are offset from the joint centre	3/48	. . . . .	one coupling part having pins arranged parallel to the axis and entering holes in the other coupling part
3/226	. . . . .	the groove centre-lines in each coupling part lying on a cylinder co-axial with the respective coupling part	3/50	. . . . .	with the coupling parts connected by one or more intermediate members ( <a href="#">F16D 3/16 takes precedence</a> )
3/2265	. . . . .	{the joints being non-telescopic}	3/52	. . . . .	comprising a continuous strip, spring, or the like engaging the coupling parts at a number of places
3/227	. . . . .	the joints being telescopic	3/54	. . . . .	Couplings comprising a chain or strip surrounding two wheels arranged side by side and provided with teeth or the equivalent
3/229	. . . . .	Prismatic coupling parts having each groove centre-line lying on planes parallel to the axis of the respective coupling part ( <a href="#">F16D 3/224, F16D 3/226 take precedence</a> )	3/56	. . . . .	comprising elastic metal lamellae, elastic rods, or the like, e.g. arranged radially or parallel to the axis, the member being shear-loaded collectively by the total load
3/24	. . . . .	comprising balls, rollers, or the like between overlapping driving faces, e.g. cogs, on both coupling parts	3/58	. . . . .	the intermediate members being made of rubber or like material
3/26	. . . . .	Hooke's joints or other joints with an equivalent intermediate member to which each coupling part is pivotally or slidably connected ( <a href="#">F16D 3/18, F16D 3/20 take precedence</a> )	3/60	. . . . .	comprising pushing or pulling links attached to both parts ( <a href="#">F16D 3/64 takes precedence</a> )
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}	3/62	. . . . .	the links or their attachments being elastic
3/28	. . . . .	in which the interconnecting pivots include elastic members	3/64	. . . . .	comprising elastic elements arranged between substantially-radial walls of both coupling parts
3/30	. . . . .	in which the coupling is specially adapted to constant velocity-ratio	3/66	. . . . .	the elements being metallic, e.g. in the form of coils
3/32	. . . . .	by the provision of two intermediate members each having two relatively perpendicular trunnions or bearings	3/68	. . . . .	the elements being made of rubber or similar material
3/33	. . . . .	with ball or roller bearings	3/70	. . . . .	comprising elastic elements arranged in holes in one coupling part and surrounding pins on the other coupling part
3/34	. . . . .	parts being connected by ridges, pins, balls, or the like guided in grooves or between cogs	3/72	. . . . .	with axially-spaced attachments to the coupling parts ( <a href="#">F16D 3/56 takes precedence</a> )
3/36	. . . . .	in which each pivot between the coupling parts and the intermediate member comprises a single ball	3/725	. . . . .	{with an intermediate member made of fibre-reinforced resin (made of rubber-like material <a href="#">F16D 3/74; shafts made of fibre-reinforced resin F16C 3/026</a> )}
			3/74	. . . . .	the intermediate member or members being made of rubber or other {rubber-like} flexible material

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- 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}	2021/0692	. . . {with two clutches arranged axially without radial overlap}
13/71	. . . in which the clutching pressure is produced by springs only	21/08	. Serially-arranged clutches interconnecting two shafts only when all the clutches are engaged (F16D 13/08, F16D 13/12 take precedence)
13/72	. . Features relating to cooling	<b>23/00</b>	<b>Details of mechanically-actuated clutches not specific for one distinct type</b>
13/74	. . Features relating to lubrication	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)
13/75	. . Features relating to adjustment, e.g. slack adjusters	23/025	. . {Synchro rings}
13/752	. . . {the adjusting device being located in the actuating mechanism arranged outside the clutch (adjusting "Bowden" mechanisms F16C 1/22)}	23/04	. . with an additional friction clutch (synchro rings per se F16D 23/025)
13/755	. . . {the adjusting device being located in or near the release bearing}	23/06	. . . and a blocking mechanism preventing the engagement of the main clutch prior to synchronisation
13/757	. . . {the adjusting device being located on or inside the clutch cover, e.g. acting on the diaphragm or on the pressure plate}	23/0606	. . . . {the blocking mechanism comprising an axially-extending shouldered pin passing through a hole in a radial wall}
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	23/0612	. . . . {the blocking mechanism comprising a radial pin in an axial slot with at least one branch}
<b>15/00</b>	<b>Clutches with wedging balls or rollers or with other wedgeable separate clutching members (freewheels, freewheel clutches F16D 41/00)</b>	2023/0618	. . . . {Details of blocking mechanism comprising a helical spring loaded element, e.g. ball}
<b>17/00</b>	<b>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</b>	2023/0625	. . . . {Details of members being coupled, e.g. gears}
<b>19/00</b>	<b>Clutches with mechanically-actuated clutching members not otherwise provided for</b>	2023/0631	. . . . {Sliding sleeves; Details thereof}
<b>21/00</b>	<b>Systems comprising a plurality of actuated clutches (for synchronisation F16D 23/04)</b>	2023/0637	. . . . {Details relating to the hub member on which the sliding is arranged}
21/02	. for interconnecting three or more shafts or other transmission members in different ways (in endless-track vehicles B62D)	2023/0643	. . . . {Synchro friction clutches with flat plates, discs or lamellae}
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	2023/065	. . . . {Means to provide additional axial force for self-energising, e.g. by using torque from the friction clutch}
21/06	. . at least two driving shafts or two driven shafts being concentric	2023/0656	. . . . {Details of the tooth structure; Arrangements of teeth}
2021/0607	. . . {Double clutch with torque input plate in-between the two clutches, i.e. having a central input plate}	2023/0662	. . . . . {Details relating to special geometry of arrangements of teeth}
2021/0615	. . . . {the central input plate is supported by bearings in-between the two clutches}	2023/0668	. . . . . {Details relating to tooth end or tip geometry}
2021/0623	. . . . {the central input plate having a damper in-between the two clutches}	2023/0675	. . . . . {Details relating to special undercut geometry}
2021/063	. . . {Electric arrangements for clutch control}	2023/0681	. . . . . {Double cone synchromesh clutches}
2021/0638	. . . {Electrically actuated multiple lamellae clutches}	2023/0687	. . . . . {Clutches with electrical actuation}
2021/0646	. . . {Electrically actuated clutch with two clutch plates}	2023/0693	. . . . . {Clutches with hydraulic actuation}
2021/0653	. . . {Hydraulic arrangements for clutch control}	23/08	. . with a blocking mechanism that only releases the clutching member on synchronisation (in combination with an additional friction clutch F16D 23/06)
2021/0661	. . . {Hydraulically actuated multiple lamellae clutches}	23/10	. . automatically producing the engagement of the clutch when the clutch members are moving at the same speed; Indicating synchronisation
2021/0669	. . . {Hydraulically actuated clutches with two clutch plates}	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)
2021/0676	. . . {Mechanically actuated multiple lamellae clutches}	2023/123	. . {Clutch actuation by cams, ramps or ball-screw mechanisms}
2021/0684	. . . {Mechanically actuated clutches with two clutch plates}	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}	25/083	. . . {Actuators therefor (F16D 25/085 - F16D 25/087 take precedence)}
23/142	. . . {with a resilient member acting radially between the bearing and its guide means}	25/085	. . . {the clutch actuation being of the pull type}
23/143	. . . {Arrangements or details for the connection between the release bearing and the diaphragm}	25/086	. . . {the clutch being actuated by a push rod extending coaxially through the input or output shaft}
23/144	. . . . {With a disengaging thrust-ring distinct from the release bearing, and secured to the diaphragm}	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)}
23/145	. . . . . {Arrangements for the connection between the thrust-ring and the diaphragm}	25/088	. . {the line of action of the fluid-actuated members being distinctly separate from the axis of rotation}
23/146	. . . . . {Arrangements for the connection between the thrust-ring and the release bearing}	25/10	. Clutch systems with a plurality of fluid-actuated clutches (arrangements or mounting of clutches in vehicles B60K 17/00)
23/147	. . . {bearing with rolling elements having at least one race or part fixed to the race blind axially, e.g. cup-shaped}	25/12	. Details not specific to one of the before-mentioned types
23/148	. . . {Guide-sleeve receiving the clutch release bearing}	25/123	. . {in view of cooling and lubrication}
<b>Clutches actuated non-mechanically</b> (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)		25/126	. . {adjustment for wear or play}
		25/14	. . {Fluid pressure control}
<b>25/00</b>	<b>Fluid-actuated clutches</b>	<b>27/00</b>	<b>Magnetically- {or electrically-} actuated clutches; Control or electric circuits therefor (clutches with magnetisable particles F16D 37/02; {with electro-rheological fluids F16D 37/008})</b>
25/02	. with means for actuating or keeping engaged by a force derived at least partially from one of the shafts to be connected	2027/001	. {Means for electric connection of the coils of the electromagnetic clutches}
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)	2027/002	. {Electric or electronic circuits relating to actuation of electromagnetic clutches}
25/042	. . {the elastic actuating member rotating with the clutch}	27/004	. {with permanent magnets combined with electromagnets}
25/044	. . . {and causing purely axial movement}	2027/005	. {Details relating to the internal construction of coils or to clutches having more than one coil in the same housing}
25/046	. . . {and causing purely radial movement}	2027/007	. {Bias of an armature of an electromagnetic clutch by flexing of substantially flat springs, e.g. leaf springs}
25/048	. . {the elastic actuating member not rotating with a coupling part}	2027/008	. {Details relating to the magnetic circuit, or to the shape of the clutch parts to achieve a certain magnetic path}
25/06	. in which the fluid actuates a piston incorporated in, {i.e. rotating with} the clutch (F16D 25/02 takes precedence)	27/01	. with permanent magnets
25/061	. . the clutch having interengaging clutch members	27/02	. with electromagnets incorporated in the clutch, i.e. with collecting rings {(F16D 27/004 takes precedence)}
25/062	. . the clutch having friction surfaces	27/025	. . {and with a helical band or equivalent member co-operating with a cylindrical coupling surface}
25/063	. . . with clutch members exclusively moving axially	27/04	. . with axially-movable friction surfaces
25/0632	. . . . with conical friction surfaces, e.g. cone clutches	27/06	. . . with friction surfaces arranged within the flux
25/0635	. . . . with flat friction surfaces, e.g. discs	27/08	. . . with friction surfaces arranged externally to the flux
25/0638	. . . . . with more than two discs, e.g. multiple lamellae	27/09	. . and with interengaging jaws or gear-teeth
25/064	. . . . the friction surface being grooved	27/10	. with an electromagnet not rotating with a clutching member, i.e. without collecting rings {(F16D 27/004 takes precedence)}
25/065	. . . with clutching members having a movement which has at least a radial component	27/102	. . with radially movable clutching members (F16D 27/105 takes precedence)
25/08	. with fluid-actuated member not rotating with a clutching member (F16D 25/02 takes precedence {F16D 25/048 takes precedence})	27/105	. . with a helical band or equivalent member co-operating with a cylindrical coupling surface
2025/081	. . {Hydraulic devices that initiate movement of pistons in slave cylinders for actuating clutches, i.e. master cylinders}	27/108	. . with axially movable clutching members
25/082	. . {the line of action of the fluid-actuated members co-inciding with the axis of rotation}	27/11	. . . with conical friction surfaces, e.g. cone clutches
		27/112	. . . with flat friction surfaces, e.g. discs

27/115	. . . . with more than two discs, e.g. multiple lamellae	35/023	. . . {the valve being actuated by a bimetallic coil ( <a href="#">F16D 35/026</a> takes precedence)}
27/118	. . with interengaging jaws or gear teeth	35/024	. . . {the valve being actuated electrically, e.g. by an electromagnet ( <a href="#">F16D 35/026</a> takes precedence)}
27/12	. Clutch systems with a plurality of electro-magnetically-actuated clutches {( <a href="#">F16D 27/004</a> takes precedence)}	35/025	. . . {the valve being actuated by inertia, e.g. using a flyweight or a centrifugal mass ( <a href="#">F16D 35/026</a> 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 <a href="#">F16D 35/022</a> - <a href="#">F16D 35/025</a> }
<b>28/00</b>	<b>Electrically-actuated clutches</b> (arrangements for synchronisation <a href="#">F16D 23/02</a> ; clutches actuated directly by means of an electromagnet <a href="#">F16D 27/00</a> ; automatic clutches <a href="#">F16D 43/00</a> - <a href="#">F16D 45/00</a> ; external control <a href="#">F16D 48/00</a> )	35/027	. . {actuated by emptying and filling with viscous fluid from outside the coupling during operation}
<b>29/00</b>	<b>Clutches and systems of clutches involving both fluid and magnetic actuation</b>	35/028	. . {actuated electrically, e.g. by an electromagnet (valves actuated electrically <a href="#">F16D 35/024</a> )}
29/005	. {with a fluid pressure piston driven by an electric motor}	35/029	. . {actuated by varying the volume of the reservoir chamber}
<b><u>Couplings or clutches with a fluid or a semi-fluid as a power-transmitting means</u></b> (fluid gearing <a href="#">F16H 39/00</a> - <a href="#">F16H 49/00</a> )		<b>37/00</b>	<b>Clutches in which the drive is transmitted through a medium consisting of small particles, e.g. centrifugally speed-responsive</b>
<b>31/00</b>	<b>Fluid couplings or clutches with pumping sets of the volumetric type, i.e. in the case of liquid passing a predetermined volume per revolution</b>	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	2037/005	. {characterised by a single substantially radial gap in which the fluid or medium consisting of small particles is arranged}
31/08	. Control of slip	2037/007	. {characterised by multiple substantially radial gaps in which the fluid or medium consisting of small particles is arranged}
<b>33/00</b>	<b>Rotary fluid couplings or clutches of the hydro-kinetic type</b>	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 <a href="#">C10M 171/001</a> )}
33/02	. controlled by changing the flow of the liquid in the working circuit, while maintaining a completely filled working circuit	37/02	. the particles being magnetisable
33/04	. . by altering the position of blades	<b>39/00</b>	<b>Combinations of couplings according to two or more of the groups <a href="#">F16D 31/00</a> - <a href="#">F16D 37/00</a></b>
33/06	. controlled by changing the amount of liquid in the working circuit	<b><u>Freewheels or freewheel clutches; Automatic clutches</u></b> ( <a href="#">F16D 31/00</a> - <a href="#">F16D 39/00</a> take precedence)	
33/08	. . by devices incorporated in the fluid coupling, with or without remote control	<b>41/00</b>	<b>Freewheels or freewheel clutches</b> (cycle brakes controlled by back-pedalling <a href="#">B62L 5/00</a> ; {one-way linear clutches <a href="#">F16B 2007/16</a> })
33/10	. . . consisting of controllable supply and discharge openings	41/02	. disengaged by contact of a part of or on the freewheel or freewheel clutch with a stationarily-mounted member
33/12	. . . . controlled automatically by self-actuated valves	41/04	. combined with a clutch for locking the driving and driven members ( <a href="#">F16D 41/02</a> , <a href="#">F16D 41/24</a> take precedence)
33/14	. . . consisting of shiftable or adjustable scoops	41/06	. with intermediate wedging coupling members between an inner and an outer surface ( <a href="#">F16D 41/02</a> , <a href="#">F16D 41/24</a> take precedence)
33/16	. . by means arranged externally of the coupling or clutch (mounting of such means in vehicles <a href="#">B60K 23/00</a> , e.g. <a href="#">B60K 23/02</a> )	2041/0601	. . {with a sliding bearing or spacer}
33/18	. Details (applicable also to fluid gearing <a href="#">F16H 41/24</a> )	2041/0603	. . {Sprag details}
33/20	. . Shape of wheels, blades, or channels with respect to function	2041/0605	. . {Spring details}
<b>35/00</b>	<b>Fluid clutches in which the clutching is predominantly obtained by fluid adhesion</b> ( <a href="#">F16D 37/00</a> takes precedence {; arrangements of viscous clutches in four-wheel drives - <a href="#">B60K 17/3465</a> and <a href="#">B60K 17/351</a> })	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}
35/005	. {with multiple lamellae}		
35/02	. with rotary working chambers and rotary reservoirs, e.g. in one coupling part		
35/021	. . {actuated by valves}		
35/022	. . . {the valve being actuated by a bimetallic strip ( <a href="#">F16D 35/026</a> takes precedence)}		



- 2041/0608 . . {Races with a regular polygon shape}
- 41/061 . . the intermediate members wedging by movement having an axial component
- 41/063 . . the intermediate members wedging by moving along the inner and the outer surface without pivoting or rolling, e.g. sliding wedges ([F16D 41/061](#) takes precedence)
- 41/064 . . the intermediate members wedging by rolling and having a circular cross-section, e.g. balls ([F16D 41/061](#) takes precedence)
- 2041/0643 . . . {the intermediate coupling members being of more than one size}
- 2041/0646 . . . {the intermediate coupling members moving between recesses in an inner race and recesses in an outer race}
- 41/066 . . . all members having the same size and only one of the two surfaces being cylindrical
- 2041/0665 . . . . {characterised by there being no cage other than the inner and outer race for distributing the intermediate members}
- 41/067 . . . . and the members being distributed by a separate cage encircling the axis of rotation
- 41/069 . . the intermediate members wedging by pivoting or rocking, e.g. sprags ([F16D 41/061](#) takes precedence)
- 41/07 . . . between two cylindrical surfaces
- 41/073 . . . . {each member comprising at least two elements at different radii}
- 41/076 . . . . {the wedging coupling members being non-releasably joined to form a single annular piece, e.g. either the members being integral projections from the piece, or the piece being an elastic ring cast round the radial centres of the members}
- 41/08 . . with provision for altering the freewheeling action
- 41/082 . . . {the intermediate coupling members wedging by movement other than pivoting or rolling}
- 41/084 . . . {the intermediate coupling members wedging by pivoting or rocking}
- 41/086 . . . {the intermediate members being of circular cross-section and wedging by rolling ([F16D 41/10](#) takes precedence)}
- 41/088 . . . . {the intermediate members being of only one size and wedging by a movement not having an axial component, between inner and outer races, one of which is cylindrical}
- 41/10 . . . with self-actuated reversing
- 41/105 . . . . {the intermediate members being of circular cross-section, of only one size and wedging by rolling movement not having an axial component between inner and outer races, one of which is cylindrical}
- 41/12 . . with hinged pawl co-operating with teeth, cogs, or the like ([F16D 41/02](#), [F16D 41/24](#) take precedence)
- 41/125 . . {the pawl movement having an axial component}
- 41/14 . . the effective stroke of the pawl being adjustable
- 41/16 . . the action being reversible
- 41/18 . . with non-hinged detent ([F16D 41/02](#), [F16D 41/24](#) take precedence)
- 41/185 . . {the engaging movement having an axial component}
- 41/20 . . with expandable or contractable clamping ring or band ([F16D 41/02](#), [F16D 41/24](#) take precedence)
- 41/203 . . {having coils overlapping in a single radial plane, e.g. Archimedian spiral}
- 41/206 . . {having axially adjacent coils, e.g. helical wrap-springs}
- 41/22 . . with clutching ring or disc axially shifted as a result of lost motion between actuating members ([F16D 41/02](#), [F16D 41/24](#) take precedence)
- 41/24 . . specially adapted for cycles
- 41/26 . . with provision for altering the action
- 41/28 . . with intermediate wedging coupling members
- 41/30 . . with hinged pawl co-operating with teeth, cogs, or the like
- 41/32 . . with non-hinged detent
- 41/34 . . with expandable or contractable clamping ring or band
- 41/36 . . with clutching ring or disc axially shifted as a result of lost motion between actuating members
- 43/00 Automatic clutches** (varying the relationship between two coaxial shafts [F16D 3/10](#); freewheels, freewheel clutches [F16D 41/00](#))
- 43/02 . . actuated entirely mechanically
- 43/04 . . controlled by angular speed ([F16D 43/24](#) takes precedence; clutches in which the drive is transmitted through a medium consisting of small particles [F16D 37/00](#))
- 43/06 . . . with centrifugal masses 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 Freewheel 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 semi-fluid 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}	2051/008	. . {Brakes with only one substantially rigid braking member}
2048/0287	. . . {Hydraulic circuits combining clutch actuation and other hydraulic systems}	51/02	. shaped as one or more circumferential band ( <a href="#">similar clutches F16D 13/12</a> )
2048/029	. . . . {Hydraulic circuits combining clutch actuation with clutch lubrication or cooling}	51/04	. . mechanically actuated
2048/0293	. . . . {Hydraulic circuits combining clutch and transmission actuation}	51/06	. . fluid actuated
2048/0296	. . . {Hydraulic circuits controlled exclusively by hydraulic pressure, i.e. with no electrically controlled valves}	51/08	. shaped as an expansible fluid-filled flexible member
48/04	. . providing power assistance	51/10	. shaped as exclusively radially-movable brake-shoes
2048/045	. . . {Vacuum boosters therefor}	51/12	. . mechanically actuated
48/06	. Control by electric or electronic means, e.g. of fluid pressure	51/14	. . fluid actuated
48/062	. . {of a clutch system with a plurality of fluid actuated clutches}	51/16	. shaped as brake-shoes pivoted on a fixed or nearly-fixed axis
48/064	. . {Control of electrically or electromagnetically actuated clutches ( <a href="#">F16D 48/062</a> , <a href="#">F16D 48/068</a> take precedence)}	51/18	. . with two brake-shoes
48/066	. . {Control of fluid pressure, e.g. using an accumulator ( <a href="#">F16D 48/062</a> , <a href="#">F16D 48/068</a> take precedence)}	51/20	. . . extending in opposite directions from their pivots
48/068	. . {using signals from a manually actuated gearshift linkage}	51/22	. . . . mechanically actuated
48/08	. . Regulating clutch take-up on starting	51/24	. . . . fluid actuated
48/10	. . Preventing unintentional or unsafe engagement	51/26	. . . both extending in the same direction from their pivots
<b>Brakes</b> (electrodynamic brake systems for vehicles in general <a href="#">B60L</a> ; dynamo-electric brakes <a href="#">H02K</a> )		51/28	. . . . mechanically actuated
<b>49/00</b>	<b>Brakes with a braking member co-operating with the periphery of a drum, wheel-rim, or the like</b> ( <a href="#">similar clutches F16D 13/10</a> )	51/30	. . . . fluid actuated
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 ( <a href="#">similar clutches F16D 13/08</a> )	51/32	. . with three or more brake shoes
49/04	. . mechanically actuated	51/34	. . . extending in opposite directions from their pivots
49/06	. . fluid actuated	51/36	. . . . mechanically actuated
49/08	. shaped as an encircling band extending over approximately 360 degrees	51/38	. . . . fluid actuated
49/10	. . mechanically actuated ( <a href="#">self-tightening F16D 49/20</a> )	51/40	. . . all extending in the same direction from their pivots
49/12	. . fluid actuated	51/42	. . . . mechanically actuated
49/14	. shaped as a fluid-filled flexible member actuated by variation of the fluid pressure	51/44	. . . . fluid actuated
49/16	. Brakes with two brake-blocks ( <a href="#">self-tightening F16D 49/20</a> )	51/46	. Self-tightening brakes with pivoted brake shoes, {i.e. the braked member increases the braking action}
49/18	. Brakes with three or more brake-blocks ( <a href="#">self-tightening F16D 49/20</a> )	51/48	. . with two linked or directly-interacting brake shoes
49/20	. Self-tightening brakes ( <a href="#">with helical or coil with more than one turn F16D 49/02</a> )	51/50	. . . mechanically actuated
49/22	. . with an auxiliary friction member initiating or increasing the action of the brake	51/52	. . . fluid actuated
<b>51/00</b>	<b>Brakes with outwardly-movable braking members co-operating with the inner surface of a drum or the like</b> ( <a href="#">similar clutches F16D 13/14</a> )	51/54	. . with three or more brake-shoes, at least two of them being linked or directly interacting
2051/001	. {Parts or details of drum brakes}	51/56	. . . mechanically actuated
2051/003	. . {Brake supports}	51/58	. . . fluid actuated
2051/005	. . {Protective covers}	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
2051/006	. . {Braking members arranged axially spaced, e.g. side by side}	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
		<b>53/00</b>	<b>Brakes with braking members co-operating with both the periphery and the inner surface of a drum, wheel-rim, or the like</b> ( <a href="#">similar clutches F16D 13/20</a> )
		<b>55/00</b>	<b>Brakes with substantially-radial braking surfaces pressed together in axial direction, e.g. disc brakes</b> ( <a href="#">similar clutches F16D 13/38</a> )
		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}	55/225	. . . . the braking members being brake pads
2055/0025	. . . {comprising a flat frame member}	55/2255	. . . . . in which the common actuating member is pivoted
2055/0029	. . . {Retraction devices}	55/226	. . . . . in which the common actuating member is moved axially, {e.g. floating caliper disc brakes}
2055/0033	. . {Fully-enclosing housings}	55/2262	. . . . . {the axial movement being guided by open sliding surfaces, e.g. grooves}
2055/0037	. . {Protective covers}	55/2265	. . . . . the axial movement being guided by one or more pins {engaging bores in the brake support or the brake housing}
2055/0041	. . {Resilient elements interposed directly between the actuating member and the brake support, e.g. anti-rattle springs}	55/22655	. . . . . {Constructional details of guide pins}
2055/0045	. . {Braking members arranged non-symmetrically with respect to the brake disc}	55/227	. . . . . by two {or more} pins
2055/005	. . {Brakes straddling an annular brake disc radially internally}	55/228	. . . with a separate actuating member for each side
2055/0054	. . {Brakes located in the radial gap between two coplanarly arranged annular brake discs}	55/24	. with a plurality of axially-movable discs, lamellae, or pads, pressed from one side towards an axially-located member
2055/0058	. . {Fully lined, i.e. braking surface extending over the entire disc circumference}	55/26	. . without self-tightening action
2055/0062	. . {Partly lined, i.e. braking surface extending over only a part of the disc circumference}	55/28	. . . Brakes with only one rotating disc
2055/0066	. . {Brakes having more than one actuator on the same side of the disc}	55/30	. . . . mechanically actuated
2055/007	. . {Pins holding the braking members}	55/31	. . . . . by means of an intermediate leverage
2055/0075	. {Constructional features of axially engaged brakes}	55/32	. . . . . actuated by a fluid-pressure device arranged in or on the brake
2055/0079	. . {with braking members arranged non-symmetrically with respect to the rotor}	55/33	. . . . . by means of an intermediate leverage
2055/0083	. . {with brake actuator located radially inside of an annular rotor}	55/34	. . . . . comprising an expansible fluid-filled flexible member coaxial with the brake
2055/0087	. . {with brake actuator located between two coplanar annular rotors}	55/36	. . . Brakes with a plurality of rotating discs all lying side by side
2055/0091	. . {Plural actuators arranged side by side on the same side of the rotor}	55/38	. . . . mechanically actuated
2055/0095	. . {Plural rotors with different properties, e.g. to influence working conditions like wear or temperature}	55/39	. . . . . by means of an intermediate leverage
55/02	. with axially-movable discs or pads pressed against axially-located rotating members	55/40	. . . . . actuated by a fluid-pressure device arranged in or on the brake
55/025	. . {with two or more rotating discs at least one of them being located axially}	55/41	. . . . . by means of an intermediate leverage
55/04	. . by moving discs or pads away from one another against radial walls of drums or cylinders	55/42	. . . . . comprising an expansible fluid-filled flexible member coaxial with the brake
55/06	. . . without self-tightening action	55/44	. . . with the rotating part consisting of both central plates and ring-shaped plates arranged concentrically around the central plates
55/08	. . . . Mechanically-actuated brakes	55/46	. . with self-tightening action
55/10	. . . . Brakes actuated by a fluid-pressure device arranged in or on the brake	55/48	. . . with discs or pads having a small free angular travel relative to their support, which produces the self-tightening action
55/12	. . . . . comprising an expansible fluid-filled flexible member coaxial with the brake	55/50	. . . with auxiliary friction members, which may be of different type, producing the self-tightening action
55/14	. . . with self-tightening action, e.g. by means of coating helical surfaces or balls and inclined surfaces	57/00	<b>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 <a href="#">B66D 5/026</a>)}</b>
55/15	. . . . initiated by means of brake-bands or brake-shoes	57/002	. {comprising a medium with electrically or magnetically controlled internal friction, e.g. electrorheological fluid, magnetic powder}
55/16	. . . . Mechanically-actuated brakes	57/005	. {Details of blades, e.g. shape}
55/18	. . . . Brakes actuated by a fluid-pressure device arranged in or on the brake	57/007	. {with variable brake geometry, e.g. axially movable rotor or stator}
55/20	. . . . . comprising an expansible fluid-filled flexible member coaxial with the brake	57/02	. with blades or like members braked by the fluid
55/22	. . by clamping an axially-located rotating disc between movable braking members, e.g. movable brake discs or brake pads	57/04	. with blades causing a directed flow, e.g. Föttinger type
55/224	. . . with a common actuating member for the braking members	57/06	. comprising a pump circulating fluid, braking being effected by throttling of the circulation
55/2245	. . . . {in which the common actuating member acts on two levers carrying the braking members, e.g. tong-type brakes ( <a href="#">similar brakes for rail vehicles <a href="#">B61H 5/00</a></a> )}	59/00	<b>Self-acting brakes, e.g. coming into operation at a predetermined speed</b>



59/02	• spring-loaded and adapted to be released by mechanical, fluid, or electromagnetic means	65/097	• • • • • Resilient means interposed between pads and supporting members {or other brake parts}
<b>61/00</b>	<b>Brakes with means for making the energy absorbed available for use</b> ( <a href="#">F16D 57/00</a> takes precedence)	65/0971	• • • • • {transmitting brake actuation force, e.g. elements interposed between brake piston and pad}
<b>63/00</b>	<b>Brakes not otherwise provided for; Brakes combining more than one of the types of groups</b> <a href="#">F16D 49/00</a> - <a href="#">F16D 61/00</a>	65/0972	• • • • • {transmitting brake reaction force, e.g. elements interposed between torque support plate and pad}
63/002	• {Brakes with direct electrical or electro-magnetic actuation}	65/0973	• • • • • {not subjected to brake forces}
63/004	• {comprising a rotor engaged both axially and radially by braking members, e.g. combined drum and disc brakes}	65/0974	• • • • • {acting on or in the vicinity of the pad rim in a direction substantially transverse to the brake disc axis}
63/006	• {Positive locking brakes}	65/0975	• • • • • {Springs made from wire}
63/008	• {Brakes acting on a linearly moving member}	65/0976	• • • • • {acting on one pad only}
<b>65/00</b>	<b>Parts or details</b> (similar members for clutches <a href="#">F16D 13/58</a> )	65/0977	• • • • • {Springs made from sheet metal}
65/0006	• {Noise or vibration control}	65/0978	• • • • • {acting on one pad only}
65/0012	• • {Active vibration dampers}	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}
65/0018	• • {Dynamic vibration dampers, e.g. mass-spring systems}	65/10	• • Drums for externally- or internally-engaging brakes
65/0025	• {Rust- or corrosion-preventing means}	65/12	• • Discs; Drums for disc brakes
65/0031	• {Devices for retaining friction material debris, e.g. dust collectors or filters}	65/121	• • • {consisting of at least three circumferentially arranged segments}
65/0037	• {Devices for conditioning friction surfaces, e.g. cleaning or abrasive elements}	65/122	• • • {adapted for mounting of friction pads}
65/0043	• {Brake maintenance and assembly, tools therefor}	65/123	• • • {comprising an annular disc secured to a hub member; Discs characterised by means for mounting}
65/005	• {Components of axially engaging brakes not otherwise provided for}	65/124	• • • • {adapted for mounting on the wheel of a railway vehicle}
65/0056	• • {Brake supports}	65/125	• • • {characterised by the material used for the disc body}
65/0062	• • • {integral with vehicle suspension, e.g. with the steering knuckle}	65/126	• • • • {the material being of low mechanical strength, e.g. carbon, beryllium; Torque transmitting members therefor}
65/0068	• • {Brake calipers}	65/127	• • • {characterised by properties of the disc surface; Discs lined with friction material}
65/0075	• • • {assembled from a plurality of parts}	65/128	• • • {characterised by means for cooling}
65/0081	• • {Brake covers}	2065/13	• • {Parts or details of discs or drums}
65/0087	• • {Brake housing guide members, e.g. caliper pins; Accessories therefor, e.g. dust boots}	2065/1304	• • • {Structure}
65/0093	• • {Brake housing guide members, e.g. caliper pins; Accessories therefor, e.g. dust boots}	2065/1308	• • • • {one-part}
65/02	• Braking members; Mounting thereof ( <a href="#">friction linings or attachment thereof F16D 69/00</a> )	2065/1312	• • • • {circumferentially segmented}
2065/022	• • {Rollers}	2065/1316	• • • • {radially segmented}
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}	2065/132	• • • • {layered}
2065/026	• • {characterised by a particular outline shape of the braking member, e.g. footprint of friction lining}	2065/1324	• • • • {carrying friction elements}
65/028	• • {Rollers}	2065/1328	• • • • {internal cavities, e.g. cooling channels}
65/04	• • Bands, shoes or pads; Pivots or supporting members therefor	2065/1332	• • • • {external ribs, e.g. for cooling or reinforcement}
65/06	• • • for externally-engaging brakes	2065/1336	• • • • {integral part of vehicle wheel}
65/062	• • • • {engaging the tread of a railway wheel}	2065/134	• • • {Connection}
65/065	• • • • {Brake bands}	2065/1344	• • • • {permanent, e.g. by casting}
65/067	• • • • • {with means for mounting, e.g. end connection members}	2065/1348	• • • • {resilient}
65/08	• • • for internally-engaging brakes	2065/1352	• • • • {articulated}
65/09	• • • • Pivots or supporting members therefor	2065/1356	• • • • {interlocking}
65/091	• • • • • {for axially holding the segments}	2065/136	• • • • • {with relative movement radially}
65/092	• • • for axially-engaging brakes, e.g. disc brakes	2065/1364	• • • • • {with relative movement axially}
65/095	• • • • Pivots or supporting members therefor	2065/1368	• • • • • {with relative movement both radially and axially}
		2065/1372	• • • • {outer circumference}
		2065/1376	• • • • {inner circumference}
		2065/138	• • • • {to wheel}

2065/1384	. . . . {to wheel hub}	65/70	. . . . for angular adjustment of two concentric parts of the brake control system
2065/1388	. . . . {to shaft or axle}	65/72	. . hydraulic
2065/1392	. . . . {Connection elements}	65/74	. . . self-acting in one direction
2065/1396	. . . . . {Ancillary resilient elements, e.g. anti-rattle or retraction springs}	65/76	. . . self-acting in both directions
65/14	. Actuating mechanisms for brakes; Means for initiating operation at a predetermined position (brake control systems, parts thereof <a href="#">B60T</a> )	65/78	. Features relating to cooling
65/16	. . arranged in or on the brake	2065/781	. . {involving phase change of material}
65/18	. . . adapted for drawing members together, {e.g. for disc brakes}	2065/782	. . {the brake-actuating fluid being used as a coolant}
65/183	. . . . {with force-transmitting members arranged side by side acting on a spot type force-applying member}	2065/783	. . {cooling control or adjustment}
65/186	. . . . {with full-face force-applying member, e.g. annular}	2065/784	. . {the coolant not being in direct contact with the braking surface}
65/22	. . . adapted for pressing members apart, {e.g. for drum brakes}	2065/785	. . {Heat insulation or reflection}
65/28	. . arranged apart from the brake	2065/786	. . {Fluid spray devices}
65/38	. Slack adjusters	2065/787	. . {Pumps}
2065/383	. . {for adjusting the spring force in spring-applied brakes}	2065/788	. . {Internal cooling channels}
2065/386	. . {driven electrically}	2065/789	. . {External cooling ribs}
65/40	. . mechanical	65/80	. . for externally-engaging brakes
65/42	. . . non-automatic	65/807	. . . with open cooling system, e.g. cooled by air
65/44	. . . . by means of direct linear adjustment	65/813	. . . with closed cooling system
65/46	. . . . with screw-thread and nut	65/82	. . for internally-engaging brakes
65/48	. . . . with eccentric or helical body	65/827	. . . with open cooling system, e.g. cooled by air
65/50	. . . . for angular adjustment of two concentric parts of the brake control system	65/833	. . . with closed cooling system
65/52	. . . self-acting in one direction for adjusting excessive play	65/84	. . for disc brakes {(discs characterised by means for cooling <a href="#">F16D 65/128</a> )}
65/54	. . . . by means of direct linear adjustment	65/847	. . . with open cooling system, e.g. cooled by air
65/543	. . . . . {comprising a plastically-deformable member}	65/853	. . . with closed cooling system
65/546	. . . . . {for mounting within the confines of a drum brake}	<b>66/00</b>	<b>Arrangements for monitoring working conditions, e.g. wear, temperature</b>
65/56	. . . . with screw-thread and nut	2066/001	. {Temperature}
65/561	. . . . . {for mounting within the confines of a drum brake}	2066/003	. {Position, angle or speed}
65/562	. . . . . {arranged between service brake actuator and braking member, and subjected to service brake force}	2066/005	. {Force, torque, stress or strain}
65/563	. . . . . {arranged adjacent to service brake actuator, e.g. on parking brake lever, and not subjected to service brake force}	2066/006	. {without direct measurement of the quantity monitored, e.g. wear or temperature calculated from force and duration of braking}
65/565	. . . . . {arranged diametrically opposite to service brake actuator, and subjected to service brake force}	2066/008	. {of clutches}
65/566	. . . . . {having a temperature-sensitive element preventing adjustment when brake is hot}	66/02	. Apparatus for indicating wear
65/567	. . . . . {for mounting on a disc brake}	66/021	. . {using electrical detection or indication means}
65/568	. . . . . {for synchronous adjustment of actuators arranged in parallel}	66/022	. . . {indicating that a lining is worn to minimum allowable thickness}
65/58	. . . . with eccentric or helical body	66/023	. . . . {directly sensing the position of braking members}
65/60	. . . . for angular adjustment of two concentric parts of the brake control systems	66/024	. . . . . {Sensors mounted on braking members adapted to contact the brake disc or drum, e.g. wire loops severed on contact}
65/62	. . . self-acting in both directions for adjusting excessive and insufficient play	66/025	. . . . . {sensing the position of parts of the brake system other than the braking members, e.g. limit switches mounted on master cylinders}
65/64	. . . . by means of direct linear adjustment	66/026	. . . {indicating different degrees of lining wear}
65/66	. . . . with screw-thread and nut	66/027	. . . . {Sensors therefor}
65/68	. . . . with eccentric or helical body	66/028	. . . {with non-electrical sensors or signal transmission, e.g. magnetic, optical}
		<b>67/00</b>	<b>Combinations of couplings and brakes; Combinations of clutches and brakes (combinations of couplings and clutches <a href="#">F16D 47/02</a>; conjoint control of brake systems and driveline clutches in vehicles <a href="#">B60W 10/02</a>, <a href="#">B60W 10/18</a>)</b>
		67/02	. Clutch-brake combinations
		67/04	. . fluid actuated
		67/06	. . electromagnetically actuated

<b>69/00</b>	<b>Friction linings; Attachment thereof; Selection of coating friction substances or surfaces (clutching elements <a href="#">F16D 13/60</a>; braking members <a href="#">F16D 65/02</a>)</b>	<b>2121/005</b>	. {unspecified force for releasing a normally applied brake}
<b>2069/001</b>	. {Material of friction lining and support element of same or similar composition}	<b>2121/02</b>	. Fluid pressure
<b>2069/002</b>	. {Combination of different friction materials}	<b>2121/04</b>	. . acting on a piston-type actuator, e.g. for liquid pressure
<b>2069/003</b>	. {Selection of coating friction materials}	<b>2121/06</b>	. . . for releasing a normally applied brake
<b>2069/004</b>	. {Profiled friction surfaces, e.g. grooves, dimples}	<b>2121/08</b>	. . acting on a membrane-type actuator, e.g. for gas pressure
<b>2069/005</b>	. {having a layered structure}	<b>2121/10</b>	. . . for releasing a normally applied brake
<b>2069/006</b>	. . {comprising a heat-insulating layer}	<b>2121/12</b>	. . for releasing a normally applied brake, the type of actuator being irrelevant or not provided for in groups <a href="#">F16D 2121/04</a> - <a href="#">F16D 2121/10</a>
<b>2069/007</b>	. . {comprising a resilient layer}	<b>2121/14</b>	. Mechanical
<b>2069/008</b>	. . {Layers of fibrous materials}	<b>2121/16</b>	. . for releasing a normally applied brake
<b>2069/009</b>	. {Linings attached to both sides of a central support element, e.g. a carrier plate}	<b>2121/18</b>	. Electric or magnetic
<b>69/02</b>	. Compositions of linings; {Methods of manufacturing}	<b>2121/20</b>	. . using electromagnets
	<b>NOTE</b>	<b>2121/22</b>	. . . for releasing a normally applied brake
	Indexing codes <a href="#">F16D 69/021</a> - <a href="#">F16D 2250/0053</a> are used for indexing aspects relating to compositions or manufacturing of friction linings	<b>2121/24</b>	. . using motors
<b>69/021</b>	. . {containing asbestos}	<b>2121/26</b>	. . . for releasing a normally applied brake
<b>69/022</b>	. . . {in the form of fibres}	<b>2121/28</b>	. . using electrostrictive or magnetostrictive elements, e.g. piezoelectric elements
<b>69/023</b>	. . {Composite materials containing carbon and carbon fibres or fibres made of carbonizable material}	<b>2121/30</b>	. . . for releasing a normally applied brake
<b>69/025</b>	. . {Compositions based on an organic binder}	<b>2121/32</b>	. . using shape memory {or other thermo-mechanical} elements
<b>69/026</b>	. . . {containing fibres}	<b>2121/34</b>	. . . for releasing a normally applied brake
<b>69/027</b>	. . {Compositions based on metals or inorganic oxides}	<b>2123/00</b>	<b>Multiple operation forces</b>
<b>69/028</b>	. . . {containing fibres}	<b>2125/00</b>	<b>Components of actuators</b>
<b>69/04</b>	. Attachment of linings	<b>2125/02</b>	. Fluid-pressure mechanisms
<b>69/0408</b>	. . {specially adapted for plane linings}	<b>2125/023</b>	. . {Pumps}
<b>69/0416</b>	. . {specially adapted for curved linings}	<b>2125/026</b>	. . {Pressure-to-pressure converters, e.g. hydropneumatic}
<b>2069/0425</b>	. . {Attachment methods or devices}	<b>2125/04</b>	. . Cylinders
<b>2069/0433</b>	. . . {Connecting elements not integral with the braking member, e.g. bolts, rivets}	<b>2125/06</b>	. . Pistons
<b>2069/0441</b>	. . . {Mechanical interlocking, e.g. roughened lining carrier, mating profiles on friction material and lining carrier}	<b>2125/08</b>	. . Seals, e.g. piston seals
<b>2069/045</b>	. . . {Bonding}	<b>2125/10</b>	. . Plural pistons interacting by fluid pressure, e.g. hydraulic force amplifiers using different sized pistons
<b>2069/0458</b>	. . . . {metallurgic, e.g. welding, brazing, sintering}	<b>2125/12</b>	. . Membrane or diaphragm types
<b>2069/0466</b>	. . . . {chemical, e.g. using adhesives, vulcanising}	<b>2125/14</b>	. . Fluid-filled flexible members, e.g. enclosed air bladders
<b>2069/0475</b>	. . . . . {comprising thermal treatment}	<b>2125/16</b>	. . Devices for bleeding or filling
<b>2069/0483</b>	. . . {Lining or lining carrier material shaped <u>in situ</u> }	<b>2125/18</b>	. Mechanical mechanisms
<b>2069/0491</b>	. . . {Tools, machines, processes}	<b>2125/20</b>	. . converting rotation to linear movement or <u>vice versa</u>
<b>71/00</b>	<b>Mechanisms for bringing members to rest in a predetermined position (combined with or controlling clutches <a href="#">F16D 43/26</a>; means for initiating operation of brakes at a predetermined position <a href="#">F16D 65/14</a>; means for securing members after operation <a href="#">F16B 1/02</a>)</b>	<b>2125/22</b>	. . . acting transversely to the axis of rotation
<b>71/02</b>	. comprising auxiliary means for producing the final movement	<b>2125/24</b>	. . . . Rack-and-pinion
<b>71/04</b>	. providing for selection between a plurality of positions ( <a href="#">F16D 71/02</a> takes precedence)	<b>2125/26</b>	. . . . Cranks
		<b>2125/28</b>	. . . . Cams; Levers with cams
		<b>2125/30</b>	. . . . acting on two or more cam followers, e.g. S-cams
		<b>2125/32</b>	. . . . acting on one cam follower
		<b>2125/34</b>	. . . acting in the direction of the axis of rotation
		<b>2125/36</b>	. . . . Helical cams, Ball-rotating ramps
		<b>2125/38</b>	. . . . with plural cam or ball-ramp mechanisms arranged concentrically with the brake rotor axis
		<b>2125/40</b>	. . . . Screw-and-nut
		<b>2125/405</b>	. . . . . {with differential thread}
		<b>2125/42</b>	. . . . Rack-and-worm gears
		<b>2125/44</b>	. . transmitting rotation
		<b>2125/46</b>	. . . Rotating members in mutual engagement
<b>2121/00</b>	<b>Type of actuator operation force</b>		

2125/48	. . . . with parallel stationary axes, e.g. spur gears	2200/0017	. . . corrosion-resistant
2125/50	. . . . with parallel non-stationary axes, e.g. planetary gearing	2200/0021	. . . Steel
2125/52	. . . . with non-parallel stationary axes, e.g. worm or bevel gears	2200/0026	. . Non-ferro
2125/54	. . . . with non-parallel non-stationary axes	2200/003	. . . Light metals, e.g. aluminium
2125/56	. . . Shafts for transmitting torque directly	2200/0034	. non-metallic
2125/565	. . . . {flexible}	2200/0039	. . Ceramics
2125/58	. . transmitting linear movement	2200/0043	. . . Ceramic base, e.g. metal oxides or ceramic binder
2125/582	. . . {Flexible element, e.g. spring, other than the main force generating element}	2200/0047	. . . Ceramic composite, e.g. C/C composite infiltrated with Si or B, or ceramic matrix infiltrated with metal
2125/585	. . . . {arranged in parallel with a force-applying member}	2200/0052	. . Carbon
2125/587	. . . {Articulation, e.g. ball-socket}	2200/0056	. . Elastomers
2125/60	. . . Cables or chains, e.g. Bowden cables	2200/006	. containing fibres or particles
2125/62	. . . . Fixing arrangements therefor, e.g. cable end attachments	2200/0065	. . Inorganic, e.g. non-asbestos mineral fibres
2125/64	. . . Levers	2200/0069	. . being characterised by their size
2125/645	. . . . {with variable leverage, e.g. movable fulcrum}	2200/0073	. . having lubricating properties
2125/66	. . . Wedges	2200/0078	. laminated
2125/68	. . . Lever-link mechanisms, e.g. toggles with change of force ratio	2200/0082	. Production methods therefor
2125/70	. . . Rods	2200/0086	. . Moulding materials together by application of heat and pressure
<b>2127/00</b>	<b>Auxiliary mechanisms</b>	2200/0091	. . Impregnating a mat of fibres with a binder
2127/001	. {for automatic or self-acting brake operation}	2200/0095	. . Mixing an aqueous slurry of fibres with a binder, e.g. papermaking process
2127/002	. . {speed-responsive}	<b>2250/00</b>	<b>Manufacturing; Assembly</b>
2127/004	. . {direction-responsive}	2250/0007	. Casting
2127/005	. . {force- or torque-responsive}	2250/0015	. . around inserts
2127/007	. {for non-linear operation}	2250/0023	. Shaping by pressure
2127/008	. {Trigger mechanisms}	2250/003	. Chip removing
2127/02	. Release mechanisms	2250/0038	. Surface treatment
2127/04	. . for manual operation	2250/0046	. . Coating
2127/06	. Locking mechanisms, e.g. acting on actuators, on release mechanisms or on force transmission mechanisms	2250/0053	. . Hardening
2127/08	. Self-amplifying or de-amplifying mechanisms	2250/0061	. Joining
2127/085	. . {having additional fluid pressure elements}	2250/0069	. . Adhesive bonding
2127/10	. . having wedging elements	2250/0076	. . Welding, brazing
2127/12	. . having additional frictional elements	2250/0084	. Assembly or disassembly
<b>2129/00</b>	<b>Type of operation source for auxiliary mechanisms</b>	2250/0092	. Tools or machines for producing linings
2129/02	. Fluid-pressure	<b>2300/00</b>	<b>Special features for couplings or clutches</b>
2129/04	. Mechanical	2300/02	. Overheat protection, i.e. means for protection against overheating
2129/043	. . {Weights}	2300/021	. . Cooling features not provided for in group <a href="#">F16D 13/72</a> or <a href="#">F16D 25/123</a> , e.g. heat transfer details
2129/046	. . {Flywheels}	2300/0212	. . . Air cooling
2129/06	. Electric or magnetic	2300/0214	. . . Oil or fluid cooling
2129/065	. . {Permanent magnets}	2300/06	. Lubrication details not provided for in group <a href="#">F16D 13/74</a>
2129/08	. . Electromagnets	2300/08	. Details or arrangements of sealings not provided for in group <a href="#">F16D 3/84</a>
2129/10	. . Motors	2300/10	. Surface characteristics; Details related to material surfaces
2129/12	. . Electrostrictive or magnetostrictive elements, e.g. piezoelectric	2300/12	. Mounting or assembling
2129/14	. Shape memory {or other thermo-mechanical} elements	2300/14	. Clutches which are normally open, i.e. not engaged in released state
<b>2131/00</b>	<b>Overall arrangement of the actuators or their elements, e.g. modular construction</b>	2300/18	. Sensor; Details or arrangements thereof
2131/02	. of the actuator controllers	2300/22	. Vibration damping
<b>2200/00</b>	<b>Materials; Production methods therefor</b>	2300/24	. Concentric actuation rods, e.g. actuation rods extending concentrically through a shaft
2200/0004	. metallic	2300/26	. Cover or bell housings; Details or arrangements thereof
2200/0008	. . Ferro		
2200/0013	. . . Cast iron		



**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
2500/30425	. . . . . Estimation of the transmitted clutch torque ej. applying dynamic torque balance equation
2500/30426	. . . . Speed of the output shaft
2500/30428	. . . . . Speed change rate of the output shaft
2500/305	. . from the clutch cooling
2500/3051	. . . Flow amount of cooling fluid
2500/3053	. . . . On/off signal indicating the presence of cooling oil flow
2500/3055	. . . Cooling oil properties
2500/3056	. . . . Cooling oil temperature
2500/3058	. . . . Cooling oil pressure
2500/306	. . from the engine
2500/3061	. . . Engine inlet air flow rate
2500/3062	. . . Engine braking signal indicating the use of the engine as a brake
2500/3063	. . . Engine fuel flow rate
2500/3064	. . . Temperature of the engine
2500/3065	. . . Torque of the engine
2500/3066	. . . . Torque change rate of the engine
2500/3067	. . . Speed of the engine
2500/3068	. . . . Speed change of rate of the engine
2500/3069	. . . Engine ignition switch
2500/308	. . from the transmission
2500/30801	. . . Number of shift actuations
2500/30802	. . . Transmission oil properties
2500/30803	. . . . Oil temperature
2500/30805	. . . . Oil pressure
2500/30806	. . . Engaged transmission ratio
2500/30807	. . . . Estimation of the engaged transmission ratio
2500/30808	. . . . Detection of transmission in neutral
2500/3081	. . . from the input shaft
2500/30812	. . . . Direction of rotation of the input shaft
2500/30814	. . . . Torque of the input shaft
2500/30816	. . . . Speed of the input shaft
2500/30818	. . . . . Speed change rate of the input shaft
2500/3082	. . . from the output shaft
2500/30822	. . . . Torque of the output shaft
2500/30825	. . . . Speed of the output shaft

2500/30827	. . . .	Speed change rate of the output shaft	2500/5012	. . .	Accurate determination of the clutch positions, e.g. treating the signal from the position sensor, or by using two position sensors for determination
2500/31	. .	from the vehicle	2500/5014	. . .	Filling the actuator cylinder with fluid
2500/3101	. . .	Detection of a brake actuation by a sensor on the brake ( <a href="#">brake pedal actuation F16D 2500/31426</a> )	2500/5016	. . .	Shifting operation, i.e. volume compensation of the master cylinder due to wear, temperature changes or leaks in the cylinder
2500/3102	. . .	Vehicle direction of travel, i.e. forward/reverse	2500/5018	. . .	Calibration or recalibration of the actuator
2500/3104	. . .	Travelled distance	2500/502	. .	Relating the clutch
2500/3105	. . .	Operational Time of clutches during vehicle life	2500/50203	. . .	Transition between manual and automatic control of the clutch
2500/3107	. . .	Vehicle weight	2500/50206	. . .	Creep control
2500/3108	. . .	Vehicle speed	2500/50209	. . . .	Activation of the creep control operation
2500/3109	. . . .	Vehicle acceleration	2500/50212	. . . . .	Accelerator pedal
2500/3111	. . . .	Standing still, i.e. signal detecting when the vehicle is standing still or below a certain limit speed	2500/50215	. . . . .	Brake pedal
2500/3112	. . . .	Vehicle acceleration change rate	2500/50218	. . . . .	Clutch pedal
2500/3114	. . .	Vehicle wheels	2500/50221	. . . . .	Manual switch actuated by the user
2500/3115	. . . .	Vehicle wheel speed	2500/50224	. . .	Drive-off
2500/3117	. . . .	Vehicle wheel torque	2500/50227	. . .	Control of clutch to control engine
2500/3118	. . . .	Slip of vehicle wheels	2500/5023	. . .	Determination of the clutch wear
2500/312	. .	External to the vehicle	2500/50233	. . .	Clutch wear adjustment operation
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
2500/3122	. . . .	Ambient temperature	2500/50239	. . .	Soft clutch engagement
2500/3124	. . .	Driving conditions, e.g. climbing hills, cornering, traffic	2500/50242	. . .	Cleaning of clutches, e.g. controlling the engine or the clutch to provoke vibrations eliminating particles from the clutch friction surfaces
2500/3125	. . .	Driving resistance, i.e. external factors having an influence in the traction force, e.g. road friction, air resistance, road slope	2500/50245	. . .	Calibration or recalibration of the clutch touch-point
2500/3127	. . . .	Road slope	2500/50248	. . . .	During assembly
2500/3128	. . .	Distance from the vehicle to an external element, e.g. to an obstacle, to an other vehicle or a target	2500/50251	. . . .	During operation
2500/314	. .	from the user	2500/50254	. . . . .	Brake actuated
2500/31406	. . .	input from pedals	2500/50257	. . . . .	During a creep operation
2500/31413	. . . .	Clutch pedal position	2500/5026	. . . . .	Gear engaged
2500/3142	. . . . .	Clutch pedal position rate	2500/50263	. . . . .	During standing still
2500/31426	. . . .	Brake pedal position	2500/50266	. . . .	Way of detection
2500/31433	. . . . .	Brake pedal position threshold, e.g. switch	2500/50269	. . . . .	Engine speed
2500/3144	. . . .	Accelerator pedal position	2500/50272	. . . . .	Gearing speed
2500/31446	. . . . .	Accelerator pedal position change rate	2500/50275	. . . . .	Estimation of the displacement of the clutch touch-point due to the modification of relevant parameters, e.g. temperature, wear
2500/31453	. . . . .	Accelerator pedal position threshold, e.g. switch	2500/50278	. . . . .	Stalling
2500/3146	. . .	input from levers	2500/50281	. . . . .	Transmitted torque
2500/31466	. . . .	Gear lever	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
2500/31473	. . . .	Parking brake lever	2500/50287	. . .	Torque control
2500/3148	. . .	Detection of user presence	2500/5029	. . . .	Reducing drag torque
2500/31486	. . .	Recognition of user style of driving, e.g. sportive, calm, nervous	2500/50293	. . .	Reduction of vibrations
2500/31493	. . .	Switches on the dashboard	2500/50296	. . .	Limit clutch wear
2500/316	. .	Other signal inputs not covered by the groups above	2500/503	. .	relating to the accumulator
2500/3161	. . .	Signal providing information about the state of engine accessories	2500/5035	. . .	Filling level of an accumulator providing fluid for the engagement of the clutch
2500/3163	. . .	Using the natural frequency of a component as input for the control	2500/504	. .	Relating the engine
2500/3165	. . .	Using the moment of inertia of a component as input for the control	2500/5041	. . .	Control of engine accessories, e.g. air conditioning, pumps, auxiliary drive
2500/3166	. . .	Detection of an elapsed period of time	2500/5043	. . .	Engine fuel consumption
2500/3168	. . .	Temperature detection of any component of the control system	2500/5045	. . .	Control of engine at idle, i.e. controlling engine idle conditions, e.g. idling speed
2500/50	. .	Problem to be solved by the control system			
2500/501	. .	Relating the actuator			

2500/5046	. . . Preventing engine over-speed, e.g. by actuation of the main clutch	2500/5122	. . . Improve passengers comfort
2500/5048	. . . Stall prevention	2500/5124	. . . Driver error, i.e. preventing effects of unintended or incorrect driver inputs
2500/506	. . Relating the transmission	2500/5126	. . . Improving response to driver inputs
2500/50607	. . . Facilitating engagement of a dog clutches, e.g. preventing of gear butting	2500/5128	. . . Driver workload reduction
2500/50615	. . . Facilitating disengagement of a dog clutch, e.g. by applying a pretension on the disengaging elements	2500/52	. . General
2500/50623	. . . Preventing transmission load change	2500/525	. . . Improve response of control system
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	2500/70	. Details about the implementation of the control system
2500/50638	. . . Shaft speed synchronising, e.g. using engine, clutch outside transmission	2500/702	. . Look-up tables
2500/50646	. . . Control of the main clutch to prevent or release a tooth-to-tooth condition in the transmission	2500/70205	. . . Clutch actuator
2500/50653	. . . Gearing shifting without the interruption of drive	2500/70211	. . . . Force
2500/50661	. . . Limit transmission input torque	2500/70217	. . . . Pressure
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	2500/70223	. . . . Current
2500/50676	. . . Optimising drive-train operating point, e.g. selecting gear ratio giving maximum fuel economy, best performance	2500/70229	. . . . Voltage
2500/50684	. . . Torque resume after shifting	2500/70235	. . . . Displacement
2500/50692	. . . Simulate the characteristics of a torque converter	2500/70241	. . . . Angle
2500/507	. . Relating the vehicle	2500/70247	. . . Engine
2500/5075	. . . Prevention or regulation of vehicle's wheel slip	2500/70252	. . . Clutch torque
2500/508	. . Relating driving conditions	2500/70258	. . . . Throttle
2500/50808	. . . Cold starting	2500/70264	. . . . Stroke
2500/50816	. . . Control during a braking operation, e.g. during ABS control	2500/7027	. . . . Engine speed
2500/50825	. . . Hill climbing or descending	2500/70276	. . . . Slip
2500/50833	. . . Control during a stability control operation [ESP]	2500/70282	. . . . Time
2500/50841	. . . Hill hold	2500/70288	. . . . Clutch pedal position
2500/5085	. . . Coasting	2500/70294	. . . Valve look-up tables
2500/50858	. . . Selecting a Mode of operation	2500/704	. . Output parameters from the control unit; Target parameters to be controlled
2500/50866	. . . Parking, i.e. control of drive units during parking	2500/70402	. . . Actuator parameters
2500/50875	. . . Driving in reverse	2500/70404	. . . . Force
2500/50883	. . . Stop-and-go, i.e. repeated stopping and starting, e.g. in traffic jams	2500/70406	. . . . Pressure
2500/50891	. . . Towing or towed	2500/70408	. . . . Torque
2500/51	. . Relating safety	2500/7041	. . . . Position
2500/5102	. . . Detecting abnormal operation, e.g. unwanted slip or excessive temperature	2500/70412	. . . . . Clutch position change rate
2500/5104	. . . Preventing failures	2500/70414	. . . . . Quick displacement to clutch touch point
2500/5106	. . . . Overheat protection	2500/70416	. . . . . Angle
2500/5108	. . . Failure diagnosis	2500/70418	. . . . . Current
2500/511	. . . . Leak detection	2500/7042	. . . . . Voltage
2500/5112	. . . . Using signals from redundant sensors	2500/70422	. . . Clutch parameters
2500/5114	. . . Failsafe	2500/70424	. . . . Outputting a clutch engaged-disengaged signal
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 ( <a href="#">F16D 2500/50248 takes precedence</a> )	2500/70426	. . . . . Clutch slip
2500/5118	. . . Maintenance	2500/70428	. . . . . Clutch slip change rate
2500/512	. . Relating to the driver	2500/7043	. . . . . Clutch temperature
		2500/70432	. . . . . From the input shaft
		2500/70434	. . . . . Input shaft torque
		2500/70436	. . . . . Input shaft speed
		2500/70438	. . . . . From the output shaft
		2500/7044	. . . . . Output shaft torque
		2500/70442	. . . . . Output shaft speed
		2500/70444	. . . . . Output shaft speed rate
		2500/70446	. . . Clutch cooling parameters
		2500/70448	. . . . for regulating the amount of fluid flow
		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
2500/7061	. . . . .	Feed-back
2500/70615	. . . . .	PI control
2500/70621	. . . . .	PD control
2500/70626	. . . . .	PID control
2500/70631	. . . . .	Feed-forward
2500/70636	. . . . .	Fuzzy logic
2500/70642	. . . . .	Inverse model
2500/70647	. . . . .	Neuronal network
2500/70652	. . . . .	Open loop
2500/70657	. . . . .	Predictor methods
2500/70663	. . . . .	State analysis; Analysing potential states of the machine and developing control strategies at each state
2500/70668	. . . . .	Signal filtering
2500/70673	. . . . .	Statistical calculations
2500/70678	. . . . .	using histogrames
2500/70684	. . . . .	using regressions
2500/70689	. . . . .	using maximum or minimum values
2500/70694	. . . . .	with plausibility checks
2500/708	. . . . .	Mathematical model
2500/7082	. . . . .	of the clutch
2500/7085	. . . . .	of the driver
2500/7087	. . . . .	of the vehicle
2500/71	. . . . .	Actions
2500/7101	. . . . .	Driver alarm
2500/7102	. . . . .	by provoking vibrations of a vehicle part
2500/7103	. . . . .	Acoustic alarms
2500/7104	. . . . .	Visual alarms
2500/7105	. . . . .	Inhibit control automatically
2500/7106	. . . . .	Gearshift to neutral
2500/7107	. . . . .	Others
2500/7108	. . . . .	Engine torque calculation
2500/7109	. . . . .	Pulsed signal; Generating or processing pulsed signals; PWM, width modulation, frequency or amplitude modulation