

CPC COOPERATIVE PATENT CLASSIFICATION

E21B EARTH DRILLING, e.g. DEEP DRILLING (mining, quarrying [E21C](#); making shafts, driving galleries or tunnels [E21D](#)); OBTAINING OIL, GAS, WATER, SOLUBLE OR MELTABLE MATERIALS OR A SLURRY OF MINERALS FROM WELLS

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:

E21B 1/12 - E21B 1/38	covered by	E21B 1/00
E21B 7/08	covered by	E21B 7/06
E21B 11/04	covered by	E21B 27/00
E21B 23/12	covered by	E21B 23/002
E21B 31/08	covered by	E21B 27/00
E21B 43/22	covered by	C09K 8/58
E21B 43/27	covered by	
E21B 47/001-E21B 47/009	covered by	
E21B 47/013-E21B 47/017	covered by	
E21B 47/0224-E21B 47/0236	covered by	
E21B 47/047-E21B 47/053	covered by	
E21B 47/07	covered by	
E21B 47/085	covered by	
E21B 47/092-E21B 47/098	covered by	
E21B 47/103-E21B 47/117	covered by	
E21B 47/125-E21B 47/135	covered by	
E21B 47/20-E21B 47/24	covered by	
E21B 47/26	covered by	

Methods or apparatus for drilling

1/00	Percussion drilling (drives used in the borehole E21B 4/00 ; rotary drilling machines in general B23B)	4/02	• Fluid rotary type drives (hydraulic turbines for drilling wells F03B 13/02)
1/02	• Surface drives for percussion drilling	4/04	• Electric drives (E21B 4/12 takes precedence)
1/04	• . . Devices for reversing the movement of the rod or cable at the surface {(not used, see E21B 1/02)}	4/06	• Down-hole impacting means, e.g. hammers (percussion drill bits E21B 10/36 ; boring rams E21B 11/02 ; releasing-jars E21B 31/107)
3/00	Rotary drilling (drives used in the borehole E21B 4/00 ; rotary drilling machines in general B23B)	4/08	• . . impact being obtained by gravity only, e.g. with lost-motion connection
3/02	• Surface drives for rotary drilling	4/10	• . . continuous unidirectional rotary motion of shaft or drilling pipe effecting consecutive impacts
3/025	• . . with a to-and-fro rotation of the tool	4/12	• . . Electrically operated hammers
3/03	• . . with an intermittent unidirectional rotation of the tool	4/14	• . . Fluid operated hammers
3/035	• . . with slipping or elastic transmission	4/145	• . . . {of the self propelled-type, e.g. with a reverse mode to retract the device from the hole}
3/04	• . . Rotary tables {(portable drilling rigs with rotary tables E21B 7/021)}	4/16	• Plural down-hole drives, e.g. for combined percussion and rotary drilling (E21B 4/10 takes precedence); Drives for multi-bit drilling units
3/045	• . . . {movably mounted on the drilling structure or platform (derricks adapted to be moved on their substructure E21B 15/003 ; specially adapted for underwater drilling, E21B 15/02)}	4/18	• Anchoring or feeding in the borehole
2003/05	• . . . {with a to-and-fro rotation of the drill pipe or casing}	4/20	• combined with surface drive (E21B 4/10 takes precedence)
3/06	• . . . Adaptation of rotary draw works to drive rotary tables (connecting or disconnecting couplings or joints E21B 19/16 ; rope, cable, or chain winding mechanisms, capstans B66D)	6/00	Drives for combined percussion and rotary drilling (drives used in the borehole E21B 4/00)
4/00	Drives used in the borehole	6/02	• the rotation being continuous
4/003	• {Bearing, sealing, lubricating details (for roller bits E21B 10/22 ; bearings in general F16C ; sealing in general F16J ; lubricating in general F16N)}	6/04	• . . Separate drives for percussion and rotation
4/006	• {Mechanical motion converting means, e.g. reduction gearings (E21B 4/10 takes precedence; gearings in general F16H)}	6/06	• the rotation being intermittent, e.g. obtained by ratchet device
		6/08	• . . Separate drives for percussion and rotation
		7/00	Special methods or apparatus for drilling
		7/001	• {Drilling a non circular hole (excavating trenches E02F 5/02 ; cutting machines for slitting E21C 25/00)}

- 7/002 . {Drilling with diversely driven shafts extending into the borehole (simultaneously drilling and casing [E21B 7/20](#); plural down-hole drives [E21B 4/16](#); [E21B 7/001](#) takes precedence)}
 - 7/003 . {Drilling with mechanical conveying means (bailers, e.g. baskets, buckets [E21B 27/00](#); tunnelling [E21D](#))}
 - 7/005 . . {with helical conveying means ([E21B 7/201](#) takes precedence; augers [E21B 10/44](#); drilling rods or pipes with helical structure [E21B 17/22](#))}
 - 7/006 . . . {combined with a bucket-type container (bailers with helical conveying means [E21B 27/04](#))}
 - 7/007 . {Drilling by use of explosives (underwater drilling using explosives [E21B 7/1245](#); setting-tools actuated by explosives [E21B 23/04](#), [E21B 23/065](#); cutting or destroying objects in boreholes by explosives [E21B 29/02](#); freeing objects using explosives [E21B 31/1075](#); gun or shaped-charge perforators [E21B 43/116](#); fracturing by explosives [E21B 43/263](#), [E21B 43/248](#); taking samples using explosives [E21B 49/04](#))}
 - 7/008 . {Drilling ice or a formation covered by ice}
 - 7/02 . Portable drilling rigs, truck-or skid-mounted, with their own drive (portable drilling rigs for use on underwater floors [E21B 7/124](#))
 - 7/021 . . {With a rotary table, i.e. a fixed rotary drive for a relatively advancing tool (rotary tables [E21B 3/04](#))}
 - 7/022 . . {Control of the drilling operation; Hydraulic or pneumatic means for activation or operation (control circuits for drilling masts [E21B 15/045](#))}
 - 7/023 . . {the mast being foldable or telescopically retractable}
 - 7/024 . . {having means for adapting to inclined terrain; having means for stabilizing the vehicle while drilling}
 - 7/025 . . {Rock drills, i.e. jumbo drills}
 - 7/026 . . {having auxiliary platforms, e.g. for observation purposes}
 - 7/027 . . {Drills for drilling shallow holes, e.g. for taking soil samples or for drilling postholes}
 - 7/028 . . . {the drilling apparatus being detachable from the vehicle, e.g. hand portable drills}
 - 7/04 . Directional drilling (derricks or masts specially adapted therefor [E21B 15/04](#))
 - 7/043 . . {for underwater installations}
 - 7/046 . . {horizontal drilling (drilling with mechanical conveying means [E21B 7/003](#))}
 - 7/06 . . Deflecting the direction of boreholes {(directional window cutting [E21B 29/06](#); deflecting the direction of fishing tools [E21B 31/14](#))}
 - 7/061 . . . {the tool shaft advancing relative to a guide, e.g. a curved tube or a whipstock}
 - 7/062 . . . {the tool shaft rotating inside a non-rotating guide travelling with the shaft ([E21B 7/067](#) and [E21B 7/068](#) take precedence)}
 - 7/064 . . . {specially adapted drill bits therefor}
 - 7/065 . . . {using oriented fluid jets}
 - 7/067 . . . {with means for locking sections of a pipe or of a guide for a shaft in angular relation, e.g. adjustable bent sub}
 - 7/068 . . . {drilled by a down-hole drilling motor (down-hole drives per se [E21B 4/00](#), [E21B 7/067](#) takes precedence)}
 - 7/10 . . Correction of deflected boreholes
 - 7/12 . Underwater drilling (derricks or masts specially adapted therefor [E21B 15/02](#); telescoping joints [E21B 17/07](#); using heave compensators [E21B 19/09](#))
 - 7/122 . . {with submersible vertically movable guide}
 - 7/124 . . with underwater tool drive prime mover, e.g. portable drilling rigs for use on underwater floors
 - 7/1245 . . . {using explosive means (Anchors driven in by explosive charges [B63B 21/28](#))}
 - 7/128 . . from floating support with independent underwater anchored guide base {(guide line systems [E21B 41/10](#))}
 - 7/132 . . from underwater buoyant support
 - 7/136 . . from non-buoyant support ([E21B 7/124](#) takes precedence)
 - 7/14 . Drilling by use of heat, e.g. flame drilling {(by use of explosives [E21B 7/007](#))}
 - 7/143 . . {underwater}
 - 7/146 . . {Thermal lances}
 - 7/15 . . of electrically generated heat
 - 7/16 . Applying separate balls or pellets by the pressure of the drill, so-called shot-drilling
 - 7/18 . Drilling by liquid or gas jets, with or without entrained pellets ([E21B 7/14](#) takes precedence; {obtaining a slurry of minerals [E21B 43/29](#)}; hydraulic monitors [E21C 45/00](#))
 - 7/185 . . {underwater}
 - 7/20 . Driving or forcing casings or pipes into boreholes, e.g. sinking; Simultaneously drilling and casing boreholes (surface means for applying to-and-fro rotation movements to the casing [E21B 3/025](#); {pushing means outside of the borehole [E21B 19/08](#)}; placing piles [E02D 7/00](#); sinking shafts while moving the lining downwards [E21D 1/08](#); {making galleries by forcing prefabricated elements through the ground [E21D 9/005](#))}
 - 7/201 . . {with helical conveying means (drilling with helical conveying means [E21B 7/005](#); augers [E21B 10/44](#); drilling rods or pipes with helical structure [E21B 17/22](#))}
 - 7/203 . . . {using down-hole drives (down-hole drives per se [E21B 4/00](#))}
 - 7/205 . . {without earth removal ([E21B 7/30](#) takes precedence)}
- NOTE**
- Special methods or apparatus for drilling without earth removal [E21B 7/26](#)
- 7/206 . . . {using down-hole drives (down-hole drives per se [E21B 4/00](#))}
 - 7/208 . . {using down-hole drives (down-hole drives per se [E21B 4/00](#); [E21B 7/203](#) and [E21B 7/206](#) take precedence)}
 - 7/24 . Drilling using vibrating or oscillating means, e.g. out-of-balance masses (percussion drilling [E21B 1/00](#))
 - 7/26 . Drilling without earth removal, e.g. with self-propelled burrowing devices ({[E21B 7/205](#) and [E21B 7/30](#) take precedence; down-hole drives [E21B 4/00](#), {e.g. self-propelled fluid-operated hammers [E21B 4/145](#)})
 - 7/265 . . {Combined with earth removal}

7/28	• Enlarging drilled holes, e.g. by counterboring (drill bits for enlarging the borehole E21B 10/26)	10/36	• Percussion drill bits (characterised by wear resisting parts E21B 10/46 {with helical conveying portion E21B 10/445 })
7/30	• . without earth removal	10/38	• . characterised by conduits or nozzles for drilling fluids
Drilling tools			
10/00	Drill bits (specially adapted for deflecting the direction of boring E21B 7/064 ; with means for collecting substances E21B 27/00)	10/40	• . with leading portion
10/003	• {with cutting edges facing in opposite axial directions}	10/42	• Rotary drag type drill bits with teeth, blades or like cutting elements, e.g. fork-type bits, fish tail bits (characterised by wear resisting parts E21B 10/54 , by conduits or nozzles for drilling fluid E21B 10/60 , by detachable or adjustable parts E21B 10/62)
10/006	• {providing a cutting edge which is self-renewable during drilling}	2010/425	• . {characterised by teeth or cutter arrangement}
10/02	• Core bits (characterised by wear resisting parts E21B 10/46 ; obtaining undisturbed cores E21B 25/00)	10/43	• . characterised by the arrangement of teeth or other cutting elements
10/04	• . with core destroying means	10/44	• Bits with helical conveying portion, e.g. screw type bits; Augers with leading portion or with detachable parts ({ Rotary drag type drill bits E21B 10/42 }; drilling rods with helical structure E21B 17/22)
10/06	• . Roller core bits	10/445	• . {percussion type, e.g. for masonry (percussion drill bits in general E21B 10/36)}
10/08	• Roller bits (roller core bits E21B 10/06 ; with leading portion E21B 10/26 ; characterised by wear resisting parts E21B 10/46)	10/46	• characterised by wear resisting parts, e.g. diamond inserts ({ drill bits with self-renewable cutting edge E21B 10/006 })
10/083	• . {with longitudinal axis, e.g. wobbling or nutating roller bit (longitudinal axis roller reamers E21B 10/30)}	10/48	• . the bit being of core type ({ saw cylinders having their cutting rim equipped with abrasive particles for drilling stone or glass B28D 1/041 })
10/086	• . {with eccentric movement}	10/485	• . . {with inserts in form of chisels, blades or the like}
10/10	• . with roller axle supported at both ends (with disc-cutters E21B 10/12)	10/50	• . the bit being of roller type
10/12	• . with discs cutters	10/52	• . . with chisel or button type inserts
10/14	• . combined with non-rolling cutters other than of leading-portion type	10/54	• . the bit being of the rotary drag type, e.g. fork-type bits
10/16	• . characterised by tooth form or arrangement	2010/545	• . . {with blades having performed cutting elements mounted on a distinct support, e.g. polycrystalline inserts}
10/18	• . characterised by conduits or nozzles for drilling fluids (drilling fluid supply to the bearings E21B 10/23)	10/55	• . . with preformed cutting elements {with blades having preformed cutting elements mounted on a distinct support, e.g. polycrystalline inserts}
10/20	• . characterised by detachable or adjustable parts, e.g. legs or axles (cross axle roller bits E21B 10/10)	10/56	• . Button type inserts (E21B 10/52 takes precedence)
10/22	• . characterised by bearing, lubrication or sealing details	2010/561	• . . {Inserts with performed cutting elements mounted on a distinct support, e.g. polycrystalline inserts}
2010/225	• . . {sealing details}	2010/562	• . . . {having a non planar or non circular cutting face}
10/23	• . . with drilling fluid supply to the bearings	2010/563	• . . . {having a cutting face with different segments, e.g. mosaic-type inserts}
10/24	• . . characterised by lubricating details	2010/564	• . . . {characterised by support details}
2010/243	• . . . {with drilling fluid supply to the bearing}	2010/565	• {Interface between the substrate and the cutting element}
10/246	• . . . {with pumping means for feeding lubricant}	2010/566	• {with chip breaking arrangements}
10/25	• . . characterised by sealing details	10/567	• . . with preformed cutting elements mounted on a distinct support, e.g. polycrystalline inserts
10/26	• Drill bits with leading portion, i.e. drill bits with a pilot cutter; Drill bits for enlarging the borehole, e.g. reamers (percussion drill bits with leading portion E21B 10/40 ; augers with leading portion E21B 10/44)	10/5673	• {having a non planar or non circular cutting face}
10/28	• . with non-expansible roller cutters	10/5676	• {having a cutting face with different segments, e.g. mosaic-type inserts}
10/30	• . . Longitudinal axis roller reamers, e.g. reamer stabilisers	10/573	• characterised by support details
10/32	• . with expansible cutting tools	10/5735	• {Interface between the substrate and the cutting element}
10/322	• . . {cutter shifted by fluid pressure (E21B 10/345 takes precedence)}	10/58	• . Chisel type inserts ({ E21B 10/485 ,} E21B 10/52 , E21B 10/54 take precedence)
10/325	• . . {the cutter being shifted by a spring mechanism}		
10/327	• . . {the cutter being pivoted about a longitudinal axis (E21B 10/34 takes precedence)}		
10/34	• . . of roller-cutter type		
10/345	• . . . {cutter shifted by fluid pressure}		

10/60	<ul style="list-style-type: none"> characterised by conduits or nozzles for drilling fluids (for roller bits E21B 10/18; for percussion drill bits E21B 10/38; {mining picks with arrangement of fluid-spraying nozzles E21C 35/187}) 	17/01	<ul style="list-style-type: none"> Risers ({connections between riser sections E21B 17/085; supporting a riser from a drilling or production platform E21B 19/004}; riser connectors {on well heads} E21B 33/038)
10/602	<ul style="list-style-type: none"> . . {the bit being a rotary drag type bit with blades} 	17/012	<ul style="list-style-type: none"> . . {with buoyancy elements (E21B 17/015 takes precedence)}
10/605	<ul style="list-style-type: none"> . . {the bit being a core-bit} 	17/015	<ul style="list-style-type: none"> . . {Non-vertical risers, e.g. articulated or catenary-type}
2010/607	<ul style="list-style-type: none"> . . {characterised by the nozzle structure} 	17/017	<ul style="list-style-type: none"> . . {Bend restrictors for limiting stress on risers}
10/61	<ul style="list-style-type: none"> . . characterised by the nozzle structure 	17/02	<ul style="list-style-type: none"> . Couplings; joints ({Expandable couplings or joints E21B 43/106})
10/62	<ul style="list-style-type: none"> characterised by parts, e.g. cutting elements, which are detachable or adjustable (E21B 10/64 takes precedence; for roller bits E21B 10/20; {for rotary drag type drill bits E21B 10/42}; for augers E21B 10/44) 	17/021	<ul style="list-style-type: none"> . . {Devices for subsurface connecting or disconnecting by rotation (connecting or disconnecting pipe couplings or joints E21B 19/16; fishing tools for frozen rods, casings, ropes, bits or the like E21B 31/00)}
2010/622	<ul style="list-style-type: none"> . . {with plural separable cutter elements} 	17/023	<ul style="list-style-type: none"> . . {Arrangements for connecting cables or wirelines to downhole devices}
2010/624	<ul style="list-style-type: none"> . . . {independently attachable} 	17/025	<ul style="list-style-type: none"> . . . {Side entry subs}
10/627	<ul style="list-style-type: none"> . . with plural detachable cutting elements 	17/026	<ul style="list-style-type: none"> . . . {Arrangements for fixing cables or wirelines to the outside of downhole devices (protectors and centralisers for cables and control lines E21B 17/1035)}
10/633	<ul style="list-style-type: none"> . . . independently detachable 	17/028	<ul style="list-style-type: none"> . . {Electrical or electro-magnetic connections}
10/64	<ul style="list-style-type: none"> characterised by the whole or part thereof being insertable into or removable from the borehole without withdrawing the drilling pipe (retrievable core receivers E21B 25/02) 	17/03	<ul style="list-style-type: none"> . . between drilling rod or pipe and drill motor, e.g. between drilling rod and hammer
10/66	<ul style="list-style-type: none"> . . the cutting element movable through the drilling pipe and laterally shiftable 	17/04	<ul style="list-style-type: none"> . . between rod {or the like} and bit or between rod and rod {or the like}
11/00	Other drilling tools ({ boring grabs E21B 27/00 })	17/042	<ul style="list-style-type: none"> . . . threaded ({readily releasing joints E21B 17/06})
11/005	<ul style="list-style-type: none"> {Hand operated drilling tools} 	17/0423	<ul style="list-style-type: none"> {with plural threaded sections, e.g. with two-step threads}
11/02	<ul style="list-style-type: none"> Boring rams (percussion drives used in the borehole E21B 4/06; percussion drill bits E21B 10/36) 	17/0426	<ul style="list-style-type: none"> {with a threaded cylindrical portion, e.g. for percussion rods}
11/06	<ul style="list-style-type: none"> with driven cutting chains or similarly driven tools 	17/043	<ul style="list-style-type: none"> with locking means
12/00	Accessories for drilling tools ({ connecting and disconnecting drill bit and drilling pipe E21B 19/18 ; sharpening stone drill bits B24B 3/33 })	17/046	<ul style="list-style-type: none"> . . . with ribs, pins or jaws, and complementary grooves or the like, e.g. bayonet catches
12/02	<ul style="list-style-type: none"> Wear indicators 	17/05	<ul style="list-style-type: none"> . . . Swivel joints
12/04	<ul style="list-style-type: none"> Drill bit protectors 	17/06	<ul style="list-style-type: none"> . . . Releasing-joints, e.g. safety joints
12/06	<ul style="list-style-type: none"> Mechanical cleaning devices 	17/07	<ul style="list-style-type: none"> . . . Telescoping joints for varying drill string lengths; Shock absorbers (heave compensators in the derrick E21B 19/09; releasing-jars E21B 31/107; {shock-absorbers in general F16F})
Other equipment or details for drilling; Well equipment or well maintenance		17/073	<ul style="list-style-type: none"> {with axial rotation}
15/00	Derricks; Masts; {Other supports (drill rigs with movable understructures E21B 7/02 })	17/076	<ul style="list-style-type: none"> {between rod or pipe and drill bit}
15/003	<ul style="list-style-type: none"> . {adapted to be moved on their substructure, e.g. with skidding means; adapted to drill a plurality of wells (slant-hole rigs E21B 15/04)} 	17/08	<ul style="list-style-type: none"> . . Casing joints
15/006	<ul style="list-style-type: none"> . {Means for anchoring the drilling machine to the ground} 	17/085	<ul style="list-style-type: none"> . . . {Riser connections (connectors for wellhead E21B 33/038)}
15/02	<ul style="list-style-type: none"> specialised adapted for underwater drilling (E21B 15/04 takes precedence; floating drilling platforms B63B 35/44; drilling platforms on legs E02B 17/00; {with skidding means E21B 15/003}) 	17/10	<ul style="list-style-type: none"> . Wear protectors; Centralising devices, {e.g. stabilisers} (drives used in the borehole with anchoring means E21B 4/18; guiding or centralising devices outside the borehole E21B 19/24)
15/04	<ul style="list-style-type: none"> specialised adapted for directional drilling, e.g. slant hole rigs ({with skidding means E21B 15/003}) 	17/1007	<ul style="list-style-type: none"> . . {for the internal surface of a pipe, e.g. wear bushings for underwater well-heads}
15/045	<ul style="list-style-type: none"> . . {Hydraulic, pneumatic or electric circuits for their positioning} 	17/1014	<ul style="list-style-type: none"> . . {Flexible or expansible centering means, e.g. with pistons pressing against the wall of the well (E21B 17/1042 takes precedence)}
17/00	Drilling rods or pipes; Flexible drill strings; Kellies; Drill collars; Sucker rods; {Cables}; Casings; Tubings (rod couplings in general F16D ; tubes or tube couplings in general F16L)	17/1021	<ul style="list-style-type: none"> . . . {with articulated arms or arcuate springs (measuring the diameter E21B 47/08)}
17/003	<ul style="list-style-type: none"> . {with electrically conducting or insulating means (E21B 17/028 and E21B 17/023 take precedence)} 	17/1028	<ul style="list-style-type: none"> {with arcuate springs only, e.g. baskets with outwardly bowed strips for cementing operations}
17/006	<ul style="list-style-type: none"> . {Accessories for drilling pipes, e.g. cleaners (wear protectors E21B 17/10; handling drilling pipes E21B 19/00; thread protectors B65D 59/00)} 		

- 17/1035 . . {for plural rods, pipes or lines, e.g. for control lines}
- 17/1042 . . {Elastomer protector or centering means}
- 17/105 . . . {split type}
- 17/1057 . . {Centralising devices with rollers or with a relatively rotating sleeve ([E21B 17/1014](#) takes precedence)}
- 17/1064 . . . {Pipes or rods with a relatively rotating sleeve}
- 17/1071 . . {specially adapted for pump rods, e.g. sucker rods}
- 17/1078 . . {Stabilisers or centralisers for casing, tubing or drill pipes (devices for off-center positioning [E21B 17/10](#); [E21B 17/1007](#) - [E21B 17/1064](#) take precedence)}
- 17/1085 . . {Wear protectors; Blast joints; Hard facing (wear protection included in centralising devices, see relevant subgroups)}
- 17/1092 . . {Gauge section of drill bits}
- 17/12 . . Devices for placing or drawing out wear protectors
- 17/14 . Casing shoes {for the protection of the bottom of the casing}
- 17/16 . Drill collars
- 17/18 . Pipes provided with plural fluid passages ([E21B 17/203](#) takes precedence; circulation of drilling fluid by means of such pipes [E21B 21/12](#); (general [F16L 39/00](#)))
- 17/20 . Flexible or articulated drilling pipes, {e.g. flexible or articulated rods, pipes or cables (risers [E21B 17/01](#); swivel joints [E21B 17/05](#))}
- 17/203 . . {with plural fluid passages}
- 17/206 . . {with conductors, e.g. electrical, optical (hoses with electrically conducting means in general [F16L 11/127](#))}
- 17/22 . Rods or pipes with helical structure (drill bits with helical conveying portion [E21B 10/44](#))
- 19/00 Handling rods, casings, tubes or the like outside the borehole, e.g. in the derrick (surface drives [E21B 1/02](#), [E21B 3/02](#))**
- 19/002 . {specially adapted for underwater drilling ([E21B 19/09](#), [E21B 19/143](#) take precedence; risers with buoyancy elements [E21B 17/012](#), [E21B 17/015](#))}
- 19/004 . . {supporting a riser from a drilling or production platform}
- 19/006 . . . {including heave compensators}
- 19/008 . {Winding units, specially adapted for drilling operations (capstans, winches [B66D](#); cathead actuated pipe wrenches or spinners [E21B 19/162](#))}
- 19/02 . Rod or cable suspensions (load-engaging elements for hoisting or lowering purposes in general [B66C 1/00](#); Crown blocks or pulley blocks [B66D](#); cable guides [B66D 1/36](#))
- 19/04 . . Hooks
- 19/06 . . Elevators, i.e. rod or tube gripping devices
- 19/07 . . . Slip-type elevators ([slips E21B 19/10](#))
- 19/08 . Apparatus for feeding the rods or cables ([E21B 19/22](#) takes precedence; automatic feed [E21B 44/02](#); hoisting drums [B66D](#)); Apparatus for increasing or decreasing the pressure on the drilling tool; Apparatus for counterbalancing the weight of the rods
- 19/081 . . Screw-and-nut feed mechanisms
- 19/083 . . Cam, rack or like feed mechanisms
- 19/084 . . with flexible drawing means, e.g. cables
- 19/086 . . with a fluid-actuated cylinder ([E21B 19/084](#), [E21B 19/087](#), [E21B 19/09](#) take precedence)
- 19/087 . . by means of a swinging arm
- 19/089 . . with a spring or an additional weight
- 19/09 . . specially adapted for drilling underwater formations from a floating support using heave compensators supporting the drill string (drilling-pipe telescoping joints [E21B 17/07](#); {heave compensators for supporting a riser [E21B 19/006](#))}
- 19/10 . Slips; Spiders; {Catching devices (rotary tables with master bushing or kelly bushing [E21B 3/04](#); slip-type elevators [E21B 19/07](#); casing heads with slips [E21B 33/0422](#))}
- 19/12 . Rope clamps (rope clamps in general [F16G 11/00](#)) {rod, casings or tube clamps not secured to elevators}
- 19/14 . Racks, ramps, troughs or bins, for holding the lengths of rod singly or connected; Handling between storage place and borehole ([E21B 19/20](#), [E21B 19/22](#) take precedence; {storing elongated articles in general [B65G 1/0442](#))}
- 19/143 . . {specially adapted for underwater drilling}
- 19/146 . . {Carousel systems, i.e. rotating rack systems}
- 19/15 . . Racking of rods in horizontal position; Handling between horizontal and vertical position
- 19/155 . . . {Handling between horizontal and vertical position}
- 19/16 . Connecting or disconnecting pipe couplings or joints ([E21B 19/20](#) takes precedence; Pipe wrenches or the like [B25B](#))
- 19/161 . . {using a wrench or a spinner adapted to engage a circular section of pipe ([E21B 19/168](#) takes precedence)}
- 19/162 . . . {cathead actuated}
- 19/163 . . . {piston-cylinder actuated}
- 19/164 . . . {motor actuated ([E21B 19/162](#) and [E21B 19/163](#) take precedence)}
- 19/165 . . {Control or monitoring arrangements therefor}
- 19/166 . . . {Arrangements of torque limiters or torque indicators}
- 19/167 . . {using a wrench adapted to engage a non circular section of pipe, e.g. a section with flats or splines}
- 19/168 . . {using a spinner with rollers or a belt adapted to engage a well pipe}
- 19/18 . Connecting or disconnecting drill bit and drilling pipe
- 19/20 . Combined feeding from rack and connecting, e.g. automatically
- 19/22 . Handling reeled pipe or rod units, e.g. flexible drilling pipes {lifting or hauling appliances using two or more cooperating endless chains [B66D 3/003](#)}
- 19/24 . Guiding or centralising devices for drilling rods or pipes
- 21/00 Methods or apparatus for flushing boreholes, e.g. by use of exhaust air from motor (freeing objects stuck in boreholes by flushing [E21B 31/03](#); well drilling compositions [C09K 8/02](#))**
- 21/001 . . {specially adapted for underwater drilling}

21/002	<ul style="list-style-type: none"> {Down-hole drilling fluid separation systems (containers comprising collecting means with a strainer E21B 27/005; subsoil filtering E21B 43/02; down-hole production separators E21B 43/38)} 	23/004	<ul style="list-style-type: none"> {Indexing systems for guiding relative movement between telescoping parts of downhole tools}
21/003	<ul style="list-style-type: none"> {Means for stopping loss of drilling fluid (plastering the borehole wall E21B 33/138)} 	23/006	<ul style="list-style-type: none"> • {"J-slot" systems, i.e. lug and slot indexing mechanisms}
2021/005	<ul style="list-style-type: none"> • {using gaseous fluids} 	2023/008	<ul style="list-style-type: none"> • {Self propelling system or apparatus, e.g. for moving tools within the horizontal portion of a borehole}
2021/006	<ul style="list-style-type: none"> • {Underbalanced techniques, i.e. where borehole fluid pressure is below formation pressure} 	23/01	<ul style="list-style-type: none"> • for anchoring the tools or the like (E21B 23/02 - E21B 23/06 take precedence; anchoring of drives in the borehole E21B 4/18; {packers E21B 33/12})
2021/007	<ul style="list-style-type: none"> • {Arrangements for handling drilling fluids or cuttings outside the borehole, e.g. mud boxes} 	23/02	<ul style="list-style-type: none"> • for locking the tools or the like in landing nipples or in recesses between adjacent sections of tubing (E21B 23/03 - E21B 23/06 take precedence)
2021/008	<ul style="list-style-type: none"> • • {Means engaging the bore entrance, e.g. hoods for collecting dust} 	23/03	<ul style="list-style-type: none"> • for setting the tools into, or removing the tools from, laterally offset landing nipples or pockets
21/01	<ul style="list-style-type: none"> • Arrangements for handling drilling fluids or cuttings outside the borehole, e.g. mud boxes ({swivel joints in hose-lines E21B 21/02;} arrangements for treating drilling fluids E21B 21/06; {waste disposal systems E21B 41/005}) 	23/04	<ul style="list-style-type: none"> • operated by fluid means, e.g. actuated by explosion (E21B 23/06, E21B 23/08 take precedence)
21/012	<ul style="list-style-type: none"> • • {using exhaust air from the drilling motor for blowing off the dust at the borehole entrance} 	23/06	<ul style="list-style-type: none"> • for setting packers
21/015	<ul style="list-style-type: none"> • • Means engaging the bore entrance, e.g. hoods for collecting dust 	23/065	<ul style="list-style-type: none"> • • {setting tool actuated by explosion or gas generating means}
21/02	<ul style="list-style-type: none"> • Swivel joints in hose-lines {(hose connections in general F16L 31/00, F16L 33/00)} 	23/08	<ul style="list-style-type: none"> • Introducing or running tools by fluid pressure, e.g. through-the-flow-line tool systems ({tool diverters E21B 23/002}; special provisions on heads therefor E21B 33/068; cementing plugs E21B 33/16; scrapers operated by fluid pressure E21B 37/04)
21/06	<ul style="list-style-type: none"> • Arrangements for treating drilling fluids outside the borehole (treating steps per se, see the relevant subclasses) 	23/10	<ul style="list-style-type: none"> • • Tools specially adapted therefor
2021/061	<ul style="list-style-type: none"> • • {for treating dust-loaded gaseous fluids} 	23/14	<ul style="list-style-type: none"> • for displacing a cable or cable-operated tool, e.g. for logging or perforating operations in deviated wells ({side entry sub E21B 17/025; control line protectors E21B 17/1035}; by fluid pressure E21B 23/08; provision on well heads for introducing or removing cable-operated tools E21B 33/072, E21B 33/076)
21/062	<ul style="list-style-type: none"> • • {by mixing components} 	25/00	Apparatus for obtaining or removing undisturbed cores, e.g. core barrels, core extractors (core bits E21B 10/02; using explosives or projectiles in boreholes E21B 49/04; side-wall sampling or coring E21B 49/06)
21/063	<ul style="list-style-type: none"> • • {by separating components} 	25/005	<ul style="list-style-type: none"> • {Above ground means for handling the core, e.g. for extracting the core from the core barrel}
21/065	<ul style="list-style-type: none"> • • • {Separating solids from drilling fluids} 	25/02	<ul style="list-style-type: none"> • the core receiver being insertable into, or removable from, the borehole without withdrawing the drilling pipe (retrievable drill bits E21B 10/64)
21/066	<ul style="list-style-type: none"> • • • • {with further treatment of the solids, e.g. for disposal} 	25/04	<ul style="list-style-type: none"> • • the core receiver having a core forming cutting edge or element, e.g. punch type core barrels
21/067	<ul style="list-style-type: none"> • • • {Separating gases from drilling fluids} 	25/06	<ul style="list-style-type: none"> • the core receiver having a flexible liner or inflatable retaining means
21/068	<ul style="list-style-type: none"> • • {using chemical treatment} 	25/08	<ul style="list-style-type: none"> • Coating, freezing, consolidating cores (E21B 25/06 takes precedence); Recovering uncontaminated cores or cores at formation pressure
21/07	<ul style="list-style-type: none"> • • for treating dust-laden gaseous fluids 	25/10	<ul style="list-style-type: none"> • Formed core retaining or severing means (E21B 25/06, E21B 25/08 take precedence)
21/08	<ul style="list-style-type: none"> • Controlling or monitoring pressure or flow of drilling fluid, e.g. automatic filling of boreholes, automatic control of bottom pressure (valve arrangements therefor E21B 21/10) 	25/12	<ul style="list-style-type: none"> • • of the sliding wedge type
21/10	<ul style="list-style-type: none"> • Valve arrangements in drilling fluid circulation systems (valves in general F16K) 	25/14	<ul style="list-style-type: none"> • • mounted on pivot transverse to core axis
21/103	<ul style="list-style-type: none"> • • {Down-hole by-pass valve arrangements, i.e. between the inside of the drill string and the annulus} 	25/16	<ul style="list-style-type: none"> • for obtaining oriented cores
21/106	<ul style="list-style-type: none"> • • {Valve arrangements outside the borehole, e.g. kelly valves} 	25/18	<ul style="list-style-type: none"> • the core receiver being specially adapted for operation under water
21/12	<ul style="list-style-type: none"> • using drilling pipes with plural fluid passages, e.g. closed circulation systems (pipes with plural fluid passages E21B 17/18) 	27/00	Containers for collecting or depositing substances in boreholes or wells, e.g. bailers, {baskets or buckets} for collecting mud or sand; Drill bits with means for collecting substances, e.g. valve drill bits
21/14	<ul style="list-style-type: none"> • using liquids and gases, e.g. foams 	27/005	<ul style="list-style-type: none"> • {Collecting means with a strainer}
21/16	<ul style="list-style-type: none"> • using gaseous fluids (E21B 21/14 takes precedence; arrangements for handling drilling fluids outside the borehole E21B 21/01; arrangements for treating drilling fluids E21B 21/06) 		
21/18	<ul style="list-style-type: none"> • Preventing exhaust air from the drill motor from blowing-off towards the working face 		
23/00	Apparatus for displacing, setting, locking, releasing, or removing tools, packers or the like in the boreholes or wells (setting of casings, screens or liners E21B 43/10)		
23/002	<ul style="list-style-type: none"> • {Tool diverters, e.g. for through-the-flow line tool systems or for wire-line tools (E21B 23/03 takes precedence; for drilling E21B 7/06)} 		

27/02	• Dump bailers, i.e. containers for depositing substances, e.g. cement or acids	31/113	• • hydraulically-operated
27/04	• where the collecting or depositing means including helical conveying means {(drilling with helical conveying means combined with bucket-type container E21B 7/006)}	31/1135	• • • {Jars with a hydraulic impedance mechanism, i.e. a restriction, for initially delaying escape of a restraining fluid}
28/00	Vibration generating arrangements for boreholes or wells, e.g. for stimulating production (for drilling E21B 7/24; {for fishing for or freeing objects E21B 31/005}; for transmitting measuring-signals E21B 47/14; for geophysical measurements G01V 1/02)	31/12	• Grappling tools, e.g. tongs or grabs
	WARNING	31/125	• • {specially adapted for parted wire line or ropes}
	Group E21B 28/00 is not complete. See also E21B 43/003	31/14	• • with means deflecting the direction of the tool, e.g. by use of knuckle joints (apparatus for deflecting the boring E21B 7/06)
29/00	Cutting or destroying pipes, packers, plugs, or wire lines, located in boreholes or wells, e.g. cutting of damaged pipes, of windows (perforators E21B 43/11); Deforming of pipes in boreholes or wells; Reconditioning of well casings while in the ground {(by enlarging drilled holes or counterboring E21B 7/28)}	31/16	• • combined with cutting or destroying means (cutting or destroying means per se E21B 29/00)
29/002	• {Cutting, e.g. milling, a pipe with a cutter rotating along the circumference of the pipe}	31/18	• • gripping externally, e.g. overshot
29/005	• • {with a radially-expansible cutter rotating inside the pipe, e.g. for cutting an annular window}	31/20	• • gripping internally, e.g. fishing spears
29/007	• • {with a radially-retracting cutter rotating outside the pipe}	33/00	Sealing or packing boreholes or wells
29/02	• by explosives or by thermal or chemical means {(freeing stuck objects by explosives E21B 31/002); destroying objects in boreholes or wells by explosives E21B 31/16)}	2033/005	• {Sealings characterised by their shape}
29/04	• Cutting of wire lines or the like (E21B 29/02 takes precedence)	33/02	• Surface sealing or packing
29/06	• Cutting windows, e.g. directional window cutters for whipstock operations ({E21B 29/005 and} E21B 29/08 take precedence ; whipstocks E21B 7/061)}	33/03	• • Well heads; Setting-up thereof (valve arrangements therefor E21B 34/02)
29/08	• Cutting or deforming pipes to control fluid flow (shear type blow-out preventers E21B 33/063)	33/035	• • • specially adapted for underwater installations (E21B 33/043, E21B 33/064, E21B 33/076 take precedence)
29/10	• Reconditioning of well casings, e.g. straightening	33/0355	• • • • {Control systems, e.g. hydraulic, pneumatic, electric, acoustic, for submerged well heads}
29/12	• specially adapted for underwater installations (E21B 29/08 takes precedence)	33/037	• • • • Protective housing therefor
31/00	Fishing for or freeing objects in boreholes or wells ({using junk baskets or the like E21B 27/00}); provisions on well heads for introducing or removing objects E21B 33/068; Locating or determining the position of objects in boreholes or wells E21B 47/09)	33/0375	• • • • {Corrosion protection means (in general C23F)}
31/002	• {Destroying the objects to be fished, e.g. by explosive means (cutting by explosives E21B 29/02)}	33/038	• • • • Connectors used on well heads, e.g. for connecting blow-out preventer and riser (connecting a production flow-line to an underwater well head E21B 43/013)
31/005	• {using vibrating or oscillating means (vibration generating arrangements for boreholes or wells E21B 28/00)}	33/0385	• • • • • {electrical connectors (underwater electrical connections in general H01R 13/523)}
31/007	• {fishing tools with means for attaching comprising fusing or sticking}	33/04	• • • Casing heads; Suspending casings or tubings in well heads (setting of casings in wells E21B 43/10)
31/03	• Freeing by flushing; {Controlling differential pipe sticking}	33/0407	• • • • {with a suspended electrical cable}
31/06	• using magnetic means	33/0415	• • • • {rotating or floating support for tubing or casing hanger}
31/107	• using impact means for releasing stuck parts, e.g. jars (telescoping joints E21B 17/07)	33/0422	• • • • {a suspended tubing or casing being gripped by a slip or an internally serrated member (slips in rotary table E21B 19/10)}
31/1075	• • {using explosives}	33/043	• • • • specially adapted for underwater well heads ({E21B 33/0407,} E21B 33/047 take precedence)
		33/047	• • • • for plural tubing strings
		33/05	• • • • Cementing-heads, e.g. having provision for introducing cementing plugs
		33/06	• • • Blow-out preventers, {i.e. apparatus closing around a drill pipe, e.g. annular blow-out preventers (rotating blow-out preventers E21B 33/085; valves E21B 34/00)}
		33/061	• • • • {Ram-type blow-out preventers, e.g. with pivoting rams}
		33/062	• • • • • {with sliding rams}
		33/063	• • • • • {for shearing drill pipes (cutting of wireline E21B 29/04; cutting pipes E21B 29/08)}
		33/064	• • • • specially adapted for underwater well heads (connectors therefor E21B 33/038; {control systems for submerged well-heads E21B 33/0355})

33/068	. . . having provision for introducing objects or fluids into, or removing objects from, wells (cementing heads E21B 33/05 ; {wipers, oil savers E21B 33/08 })	33/13	. . Methods or devices for cementing, for plugging holes, crevices, or the like (dump bailers E21B 27/02 ; {methods or apparatus for grouting offshore structures E02B 17/0008 } chemical compositions therefor C09K 8/00)
33/072	. . . . for cable-operated tools (E21B 33/076 takes precedence)	33/134	. . . Bridging plugs ({packers E21B 33/12 })
33/076	. . . . specially adapted for underwater installations	33/136	. . . Baskets, e.g. of umbrella type
33/08	. . Wipers; Oil savers	33/138	. . . Plastering the borehole wall; Injecting into the formations ({packers E21B 33/12 ; consolidation of loose sand or the like round the wells without excessively decreasing the permeability thereof E21B 43/025 , compositions therefor C09K 8/56 })
33/085	. . . {Rotatable packing means, e.g. rotating blow-out preventers}	33/14	. . . for cementing casings into boreholes ({using special cement compositions C09K 8/42 ; control of cementation quality or level E21B 47/0005 })
33/10	. in the borehole ({sealing the junction between main bore and laterals E21B 41/0042 })	33/143	. . . . {for underwater installations}
2033/105	. . {characterised by sealing the junction between a lateral and a main bore}	33/146	. . . . {Stage cementing, i.e. discharging cement from casing at different levels}
33/12	. . Packers; Plugs ({locking packers or plugs in landing nipples E21B 23/02 ; used for cementing E21B 33/134 , E21B 33/16 })	33/16	. . . . using plugs for isolating cement charge; Plugs therefor ({spacer compositions C09K 8/424 ; stage cementing E21B 33/146 })
33/1204	. . . {permanent; drillable}	34/00	Valve arrangements for boreholes or wells (in drilling fluid circulation systems E21B 21/10; {tool diverters E21B 23/002; blow-out preventers E21B 33/06; oil flow regulating apparatus E21B 43/12; valves in general F16K})
33/1208	. . . {characterised by the construction of the sealing or packing means (E21B 33/1277 takes precedence)}	2034/002	. {Ball valves}
33/1212	. . . . {including a metal-to-metal seal element}	2034/005	. {Flapper valves}
33/1216	. . . . {Anti-extrusion means, e.g. means to prevent cold flow of rubber packing}	2034/007	. {Sleeve valves}
33/122	. . . Multiple string packers	34/02	. in well heads
33/124	. . . Units with longitudinally-spaced plugs for isolating the intermediate space	34/04	. . in underwater well heads
33/1243	. . . . {with inflatable sleeves}	34/045	. . . {adapted to be lowered on a tubular string into position within a blow-out preventer stack, e.g. so-called test trees}
33/1246	. . . . . {inflated by down-hole pumping means operated by a pipe string}	34/06	. in wells
33/126	. . . with fluid-pressure-operated elastic cup or skirt (E21B 33/122 , E21B 33/124 take precedence)	34/063	. . {Valve or closure with destructible element, e.g. frangible disc (E21B 34/103 takes precedence)}
33/1265	. . . . {with mechanical slips}	34/066	. . {electrically actuated}
33/127	. . . with inflatable sleeve (E21B 33/122 , E21B 33/124 take precedence)	34/08	. . responsive to flow or pressure of the fluid obtained (E21B 34/10 takes precedence)
33/1272	. . . . {inflated by down-hole pumping means operated by a pipe string}	34/085	. . . {with time-delay systems, e.g. hydraulic impedance mechanisms}
33/1275	. . . . {inflated by down-hole pumping means operated by a down-hole drive}	34/10	. . operated by control fluid supplied from above ground ({by a dropped ball or piston E21B 34/14 ; above-ground control means E21B 34/16 })
33/1277	. . . . {characterised by the construction or fixation of the sleeve}	34/101	. . . {with means for equalizing fluid pressure above and below the valve}
33/128	. . . with a member expanded radially by axial pressure (E21B 33/122 , E21B 33/124 , { E21B 33/129 } take precedence; {characterised by the construction of the sealing means E21B 33/1208 })	34/102	. . . {with means for locking the closing element in open or closed position (E21B 34/105 and E21B 34/108 take precedence)}
33/1285	. . . . {by fluid pressure}	34/103	. . . . {with a shear pin}
33/129	. . . with mechanical slips for hooking into the casing (E21B 33/122 , E21B 33/124 take precedence)	34/105	. . . {retrievable, e.g. wire line retrievable, i.e. with an element which can be landed into a landing-nipple provided with a passage for control fluid}
33/1291	. . . . {anchor set by wedge or cam in combination with frictional effect, using so-called drag-blocks (E21B 33/1295 takes precedence)}	34/106	. . . . {the retrievable element being a secondary control fluid actuated valve landed into the bore of a first inoperative control fluid actuated valve}
33/1292	. . . . . {with means for anchoring against downward and upward movement}		
33/1293	. . . . . {with means for anchoring against downward and upward movement (E21B 33/1291 , E21B 33/1295 take precedence)}		
33/1294	. . . . {characterised by a valve, e.g. a by-pass valve}		
33/1295	. . . . actuated by fluid pressure		
33/12955	. . . . . {using drag blocks frictionally engaging the inner wall of the well}		

- 34/107 . . . {the retrievable element being an operating or controlling means retrievable separately from the closure member, e.g. pilot valve landed into a side pocket ([E21B 34/106](#) takes precedence)}
- 34/108 . . . {with time delay systems, e.g. hydraulic impedance mechanisms}
- 34/12 . . operated by movement of casings or tubings
- 34/125 . . . {with time delay systems, e.g. hydraulic impedance mechanisms}
- 34/14 . . operated by movement of tools, e.g. sleeve valves operated by pistons or wire line tools {([E21B 34/066](#) takes precedence)}
- 34/16 . Above-ground control means therefor {(control systems for submerged well heads [E21B 33/0355](#))}

35/00 **Methods or apparatus for preventing or extinguishing fires** (cutting or deforming pipes to control fluid flow [E21B 29/08](#); controlling flow of fluid to or in wells [E21B 43/12](#); fire fighting in general [A62C](#), [A62D](#))

36/00 **Heating, cooling, insulating arrangements for boreholes or wells, e.g. for use in permafrost zones** (drilling by use of heat [E21B 7/14](#); secondary recovery methods using heat [E21B 43/24](#))

- 36/001 . {Cooling arrangements}
- 36/003 . {Insulating arrangements}
- 36/005 . {Heater surrounding production tube}
- 36/006 . {Combined heating and pumping means}
- 36/008 . {using chemical heat generating means}
- 36/02 . using burners
- 36/025 . . {the burners being above ground or outside the bore hole}
- 36/04 . using electrical heaters

37/00 **Methods or apparatus for cleaning boreholes or wells** ([E21B 21/00](#) takes precedence; {bailers [E21B 27/00](#); } cleaning pipes in general [B08B 9/02](#))

- 37/02 . Scrapers specially adapted therefor
- 37/04 . . operated by fluid pressure, e.g. free-piston scrapers (operating other tools by fluid pressure [E21B 23/08](#))
- 37/045 . . . {Free-piston scrapers}
- 37/06 . using chemical means for preventing, limiting {or eliminating} the deposition of paraffins or like substances (chemical compositions therefor [C09K 8/52](#))
- 37/08 . cleaning *in situ* of down-hole filters, screens, {e.g. casing perforations,} or gravel packs ([E21B 37/06](#) takes precedence)
- 37/10 . Well swabs {(pistons in general [F16J](#))}

40/00 **Tubing catchers, automatically arresting the fall of oil-well tubing** {(preventing small objects from falling into the borehole [E21B 41/0021](#))}

41/00 **Equipment or details not covered by groups [E21B 15/00](#) - [E21B 40/00](#)**

- 41/0007 . {for underwater installations ([E21B 41/005](#), [E21B 41/04](#), [E21B 41/06](#), [E21B 41/08](#), [E21B 41/10](#) take precedence)}
- 41/0014 . . {Underwater well locating or reentry systems}
- 41/0021 . {Safety devices, e.g. for preventing small objects from falling into the borehole}

- 2041/0028 . {Fuzzy logic, artificial intelligence, neural networks, or the like}
- 41/0035 . {Apparatus or methods for multilateral well technology, e.g. for the completion of or workover on wells with one or more lateral branches (whipstocks [E21B 7/061](#); tool diverters [E21B 23/002](#); cutting casing windows [E21B 29/06](#); specific well pattern [E21B 43/30](#))}
- 41/0042 . . {characterised by sealing the junction between a lateral and a main bore}
- 41/005 . {Waste disposal systems (treatment of drilling fluid outside the borehole [E21B 21/06](#); collecting oil or the like from a submerged leakage [E21B 43/0122](#))}
- 41/0057 . . {Disposal of a fluid by injection into a subterranean formation}
- 41/0064 . . . {Carbon dioxide sequestration (storing fluids in porous layers [B65G 5/005](#))}
- 41/0071 . . {Adaptation of flares, e.g. arrangements of flares in offshore installations (flares of waste gases or noxious gases [F23G 7/08](#))}
- 41/0078 . {Nozzles used in boreholes (drilling by liquid or gas jets [E21B 7/18](#); drill bits with nozzles [E21B 10/60](#); perforators using direct fluid action [E21B 43/114](#); obtaining a slurry of minerals using nozzles [E21B 43/29](#); nozzles in general [B05B](#))}
- 41/0085 . {Adaptations of electric power generating means for use in boreholes (generation of electric power *per se* [H02](#))}
- 41/0092 . {Methods relating to program engineering, design or optimisation}
- 41/02 . *in situ* inhibition of corrosion in boreholes or wells (dump bailers [E21B 27/02](#); chemical compositions therefor [C09K 8/54](#); inhibiting corrosion in general [C23F](#))
- 41/04 . Manipulators for underwater operations, e.g. temporarily connected to well heads (manipulators in general [B25J](#))
- 41/06 . Work chambers for underwater operations, e.g. temporarily connected to well heads (in general [B63C 11/00](#))
- 41/08 . Underwater guide bases, e.g. drilling templates; Levelling therefor

WARNING

This group was introduced in January 2000. Patent documents are continuously being reclassified to this group from groups [E21B 7/12](#), [E21B 33/035](#), [E21B 43/017](#)

- 41/10 . Guide posts, e.g. releasable; Attaching guide lines to underwater guide bases

Obtaining fluids from wells

- 43/00** **Methods or apparatus for obtaining oil, gas, water, soluble or meltable materials or a slurry of minerals from wells** (applicable only to water [E03B](#); obtaining oil-bearing deposits or soluble or meltable materials by mining techniques [E21C 41/00](#); pumps [F04](#))
- 43/003 . {Vibrating earth formations (vibration generating arrangements for boreholes or wells [E21B 28/00](#))}
- 43/006 . {Production of coal-bed methane ([E21B 43/243](#) takes precedence; methods or devices for drawing-off gases for safety purposes in mines [E21F 7/00](#))}

- 43/01 . . specially adapted for obtaining from underwater installations ([underwater well heads E21B 33/035](#))
- 43/0107 . . {Connecting of flow lines to offshore structures ([E21B 43/013 takes precedence](#))}
- 2043/0115 . . {Drilling for or production of natural gas hydrate reservoirs; Drilling through or monitoring of formations containing gas hydrates}
- 43/0122 . . {Collecting oil or the like from a submerged leakage (cleaning or keeping clear the surface of open water from oil or the like [E02B 15/04](#))}
- 43/013 . . connecting a production flow line to an underwater well head
- 43/0135 . . . {using a pulling cable}
- 43/017 . . Production satellite stations, i.e. underwater installations comprising a plurality of satellite well heads connected to a central station ([underwater separating arrangements E21B 43/36](#))
- 43/02 . . Subsoil filtering ([E21B 43/11 takes precedence](#), chemical compositions for consolidating loose sand or the like around wells [C09K 8/56](#))
- 43/025 . . {Consolidation of loose sand or the like round the wells without excessively decreasing the permeability thereof (sealing borehole walls [E21B 33/138](#))}
- 43/04 . . Graveling of wells
- 43/045 . . . {Crossover tools}
- 43/08 . . Screens or liners {(expandable screens or liners [E21B 43/108](#); obtaining drinking water; filters [E03B 3/18](#))}
- 43/082 . . . {Screens comprising porous materials, e.g. prepacked screens}
- 43/084 . . . {Screens comprising woven materials, e.g. mesh or cloth}
- 43/086 . . . {Screens with preformed openings, e.g. slotted liners (comprising porous materials [E21B 43/082](#))}
- 43/088 . . . {Wire screens (comprising porous materials [E21B 43/082](#); comprising woven materials [E21B 43/084](#))}
- 43/10 . . Setting of casings, screens, liners {or the like} in wells (driving or forcing casings into boreholes, simultaneously drilling and casing boreholes [E21B 7/20](#); setting of tools, packers or the like [E21B 23/00](#); suspending casings in well heads [E21B 33/04](#))
- 43/101 . . . {for underwater installations}
- 43/103 . . . {of expandable casings, screens, liners, or the like}
- 43/105 {Expanding tools specially adapted therefor}
- 43/106 {Couplings or joints therefor}
- 43/108 {Expandable screens or liners}
- 43/11 . . Perforators; Permeators
- 43/112 . . Perforators with extendable perforating members, e.g. actuated by fluid means
- 43/114 . . Perforators using direct fluid action {on the wall to be perforated}, e.g. abrasive jets
- 43/116 . . Gun or shaped charge perforators {(projectiles with shaped or hollow charge [F42B 12/10](#))}
- 43/117 . . . Shaped charge perforators ([E21B 43/118 takes precedence](#))
- 43/118 . . . characterised by lowering in vertical position and subsequent tilting to operating position
- 43/1185 . . . Ignition systems
- 43/11852 {hydraulically actuated}
- 43/11855 {mechanically actuated, e.g. by movement of a wireline or a drop-bar ([E21B 43/11852 takes precedence](#))}
- 43/11857 {firing indication systems}
- 43/119 . . Details, e.g. for locating perforating place or direction
- 43/1195 . . . {Replacement of drilling mud; decrease of undesirable shock waves}
- 43/12 . . Methods or apparatus for controlling the flow of the obtained fluid to or in wells ([E21B 43/25 takes precedence](#); valve arrangements [E21B 34/00](#))
- 43/121 . . {Lifting well fluids (survey of down-hole pump systems [E21B 47/0007](#))}
- 43/122 . . . {Gas lift}
- 43/123 {Gas lift valves}
- 43/124 . . . {Adaptation of jet-pump systems}
- 2043/125 . . . {Adaptation of walking-beam pump systems}
- 43/126 . . . {Adaptations of down-hole pump systems powered by drives outside the borehole, e.g. by a rotary or oscillating drive (powered by fluid [E21B 43/129](#))}
- 43/127 {Adaptations of walking-beam pump systems}
- 43/128 . . . {Adaptation of pump systems with down-hole electric drives}
- 43/129 . . . {Adaptations of down-hole pump systems powered by fluid supplied from outside the borehole (gas-lift [E21B 43/122](#); jet pumps [E21B 43/124](#))}
- 43/14 . . Obtaining from a multiple-zone well
- 43/16 . . Enhanced recovery methods for obtaining hydrocarbons (fracturing [E21B 43/26](#); obtaining slurry [E21B 43/29](#); reclamation of contaminated soil in situ [B09C](#); {chemical compositions therefor [C09K 8/58](#)})
- 43/162 . . {Injecting fluid from longitudinally spaced locations in injection well}
- 43/164 . . {Injecting CO₂ or carbonated water (in combination with organic material [C09K 8/594](#))}
- 43/166 . . {Injecting a gaseous medium; Injecting a gaseous medium and a liquid medium (CO₂ injection [E21B 43/164](#); steam injection [E21B 43/24](#))}
- 43/168 . . . {Injecting a gaseous medium}
- 43/17 . . Interconnecting two or more wells by fracturing or otherwise attacking the formation ({[E21B 43/2405](#),} [E21B 43/247](#) take precedence)
- 43/18 . . Repressuring or vacuum methods
- 43/20 . . Displacing by water
- 43/24 . . using heat, e.g. steam injection (heating, cooling or insulating wells [E21B 36/00](#) {; in combination with organic material [C09K 8/592](#)})
- 43/2401 . . . {by means of electricity}
- 43/2403 . . . {by means of nuclear energy (nuclear reactors [G21](#))}
- 43/2405 . . . {in association with fracturing or crevice forming processes ([E21B 43/247 takes precedence](#))}
- 43/2406 . . . {Steam assisted gravity drainage [SAGD]}

43/2408 {SAGD in combination with other methods}

WARNING

Not complete pending a reorganisation.

See also [E21B 43/24](#) and subgroups

- 43/241 . . . combined with solution mining of non-hydrocarbon minerals, e.g. solvent pyrolysis of oil shale
- 43/243 . . . Combustion in situ
- 43/247 in association with fracturing processes {or crevice forming processes}
- 43/248 using explosives
- 43/25 . Methods for stimulating production (dump bailers [E21B 27/02](#); vibration generating arrangements [E21B 28/00](#) {; by vibrating earth formations [E21B 43/003](#)}; chemical compositions therefor [C09K 8/60](#))
- 43/255 . . {including the injection of a gaseous medium as treatment fluid into the formation}
- 43/26 . . by forming crevices or fractures {(chemical compositions therefor [C09K 8/62](#))}
- 43/261 . . . {Separate steps of (1) cementing, plugging or consolidating and (2) fracturing or attacking the formation}
- 43/263 . . . using explosives {(Combustion in situ using explosives [E21B 43/248](#))}
- 43/2635 {by means of nuclear energy (peaceful applications of nuclear explosive devices in general [G21J 3/00](#))}
- 43/267 . . . reinforcing fractures by propping {(chemical compositions therefor [C09K 8/80](#))}
- 43/28 . Dissolving minerals other than hydrocarbons, e.g. by an alkaline or acid leaching agent ([E21B 43/241](#) takes precedence; {using steerable or laterally extendable nozzles [E21B 43/292](#)})
- 43/281 . . {using heat (heating, cooling or insulating wells [E21B 36/00](#))}
- 43/283 . . {in association with a fracturing process}
- 43/285 . Melting minerals, e.g. sulfur ([E21B 43/24](#) takes precedence; heating, cooling or insulating arrangements for wells [E21B 36/00](#))
- 43/29 . Obtaining a slurry of minerals, e.g. by using nozzles
- 43/292 . . {using steerable or laterally extendable nozzles}
- 43/295 . Gasification of minerals, e.g. for producing mixtures of combustible gases ([E21B 43/243](#) takes precedence)
- 43/30 . Specific pattern of wells, e.g. optimizing the spacing of wells (production satellite stations [E21B 43/017](#))
- 43/305 . . {comprising at least one inclined or horizontal well}
- 43/32 . Preventing gas- or water- coning phenoma, i.e. the formation of a conical column of gas or water around wells
- 43/34 . Arrangements for separating materials produced by the well (separating apparatus per se, see the relevant subclasses)
- 43/36 . . Underwater separating arrangements ([E21B 43/38](#) takes precedence)
- 43/38 . . in the well
- 43/385 . . . {by reinjecting the separated materials into an earth formation in the same well}

- 43/40 . . Separation associated with re-injection of separated materials {([E21B 43/385](#) takes precedence)}

Automatic control, surveying or testing

- 44/00** Automatic control systems specially adapted for drilling operations, i.e. self-operating systems which function to carry out or modify a drilling operation without intervention of a human operator, e.g. computer-controlled drilling systems (for non-automatic drilling control, see the operation controlled; automatic feeding from rack and connecting of drilling pipes [E21B 19/20](#); controlling pressure or flow of drilling fluid [E21B 21/08](#); control systems in general [G05](#)); Systems specially adapted for monitoring a plurality of drilling variables or conditions (means for transmitting measuring-signals from the well to the surface [E21B 47/12](#))
 - 44/005 . {Below-ground automatic control systems}
 - 44/02 . Automatic control of the tool feed ({[E21B 44/005](#)}, [E21B 44/10](#) take precedence)
 - 44/04 . . in response to the torque of the drive; {Measuring drilling torque ([E21B 44/06](#) takes precedence; measuring stresses in a well bore pipe [E21B 47/0006](#))}
 - 44/06 . . in response to the flow or pressure of the motive fluid of the drive
 - 44/08 . . in response to the amplitude of the movement of the percussion tool, e.g. jump or recoil
 - 44/10 . Arrangements for automatic stopping when the tool is lifted from the working face {(informative reference: arrangements for automatic stopping for portable percussive tools [B25D 9/265](#))}
- 45/00** Measuring the drilling time or rate of penetration
- 47/00** Survey of boreholes or wells (monitoring pressure or flow of drilling fluid [E21B 21/08](#); geophysical logging [G01V](#))
 - 47/0001 . {for underwater installations}
 - 47/0002 . {Survey of boreholes or wells by visual inspection (photographing internal surfaces, e.g. of pipes [G03B 37/005](#); closed circuit television systems [H04N 7/18](#))}
 - 47/0003 . {Determining well or borehole volumes (determining depth [E21B 47/04](#), diameter [E21B 47/08](#); measuring volumes in general [G01F](#))}
 - 47/0005 . {control of cementation quality or level (measuring temperature [E21B 47/065](#))}
 - 47/0006 . {Measuring stresses in a well bore pipe string or casing (for locating stuck pipe [E21B 47/09](#))}
 - 47/0007 . {Survey of down-hole pump systems}
 - 47/0008 . . {Survey of walking-beam pump systems, e.g. for the detection of so called "pumped-off" conditions}

- 47/01 . Devices for supporting measuring instruments on a drill pipe, rod or wireline ([setting or locking tools in boreholes or wells E21B 23/00](#)); ([flexible centering means per se E21B 17/1014](#)) Protecting measuring instruments in boreholes against heat, shock, pressure or the like
- NOTE**
- Devices for both supporting and protecting measuring instruments are only classified in [E21B 47/011](#)
- 47/011 . . {Protecting measuring instruments ([cooling or insulating arrangements for boreholes or wells E21B 36/00](#))}
- 47/02 . Determining slope or direction ([clinometers or direction meters G01C](#))
- 47/022 . . of the borehole, {e.g. using geomagnetism}
- 47/02208 . . . {using seismic or acoustic means}
- 47/02216 . . . {using at least one source of electromagnetic energy and at least one detector therefor}
- 47/02224 {at least one of the sources or one of the detectors being located above ground}
- 47/02232 . . . {using a pendulum}
- 47/024 . . of devices in the borehole ([E21B 47/022 takes precedence](#))
- 47/026 . . of penetrated ground layers ([apparatus for obtaining oriented cores E21B 25/16](#); [formation testing E21B 49/00](#))
- 47/04 . Measuring depth or liquid level ([measuring liquid level in general](#) {and [telerecorders for level of liquids](#) [G01F](#); {measuring depth in general [G01B 7/26](#)})
- 47/042 . . {Measuring or locating liquid level ([E21B 47/044 takes precedence](#))}
- 47/044 . . {using radioactive markers}
- 47/06 . Measuring temperature or pressure ([measuring temperature in general G01K](#); [measuring pressure in general G01L](#) {[telerecorders for pressure G01L](#); [telerecorders for temperature G01K](#)})
- 47/065 . . {Measuring temperature}
- 47/08 . Measuring the diameter ([measuring diameter in general G01B](#))
- 47/082 . . {using radiant means, e.g. acoustic, radioactive, electromagnetic}
- 47/09 . Locating or determining the position of objects in boreholes or wells, {e.g. the position of an extending arm}; Identifying the free or blocked portions of pipes ([measuring depth E21B 47/04](#); [measuring diameter E21B 47/08](#))
- 47/0905 . . {by detecting magnetic anomalies ([investigating materials by investigating magnetic variables G01N 27/72](#))}
- 47/091 . . {by detecting an acoustic anomaly, e.g. a mud-pressure pulse}
- 47/0915 . . {using impression packers, e.g. to detect recesses or perforations}
- 47/10 . Locating fluid leaks, intrusions or movements ([using impression packers E21B 47/0915](#); [flow measurement in general G01F](#); [examining density and leaking in general G01M](#))
- 47/1005 . . {using thermal measurements ([measurement temperature E21B 47/065](#))}
- 47/101 . . {using acoustic energy}
- 47/1015 . . {using tracers: using radioactivity}
- 47/102 . . {using electrical indications: using light radiations}
- 47/1025 . . {Detecting leaks, e.g. of tubing, by pressure testing ([investigating fluid-tightness of structures by using fluid or vacuum G01M 3/02](#))}
- 47/12 . Means for transmitting measuring-signals {or control signals} from the well to the surface {or from the surface to the well}, e.g. for logging while drilling ([remote signalling in general G08](#))
- 47/121 . . {using earth as an electrical conductor ([E21B 47/122 takes precedence](#); in general [H04B 13/02](#); [electric prospecting G01V 3/00](#))}
- 47/122 . . {by electromagnetic energy, e.g. radio frequency ([in general H04B](#); [magnetic prospecting G01V 3/00](#))}
- 47/123 . . . {using light waves ([optical transmission in general H04B 10/00](#); [light guides, e.g. optical fibres G02B 6/00](#))}
- 47/124 . . {Storing data down-hole, e.g. in a memory or on a record carrier ([recording in connection with measuring in general G01D](#); [information storage in general G11](#))}
- 47/14 . . using acoustic waves
- 47/16 . . . through the drill string or casing, {e.g. by torsional acoustic waves}
- 47/18 . . . through the well fluid, {e.g. mud pressure pulse telemetry}
- 47/182 {by continuous mud waves with modulation of the waves}
- 47/185 {by negative mud pulses using a pressure relieve valve between drill pipe and annulus}
- 47/187 {by positive mud pulses using a flow restricting valve within the drill pipe}
- 49/00 Testing the nature of borehole walls; Formation testing; Methods or apparatus for obtaining samples of soil or well fluids, specially adapted to earth drilling or wells ([sampling in general G01N 1/00](#))**
- 49/001 . {specially adapted for underwater installations}
- 49/003 . {by analysing drilling variables or conditions ([E21B 49/005 takes precedence](#); [Systems specially adapted for monitoring a plurality of drilling variables or conditions E21B 44/00](#))}
- 49/005 . {Testing the nature of borehole walls or the formation by using drilling mud or cutting data ([investigating chemical or physical properties of materials per se G01N](#))}
- 49/006 . {Measuring wall stresses in the borehole ([investigation of mechanical properties of foundation soil E02D 1/022](#))}
- 49/008 . {by injection test; by analysing pressure variations in an injection or production test, e.g. for estimating the skin factor ([measuring pressure E21B 47/06](#); [obtaining fluid samples or testing fluids E21B 49/08](#))}
- 49/02 . by mechanically taking samples of the soil ([apparatus for obtaining undisturbed cores E21B 25/00](#); [investigation of foundation soil in situ E02D 1/00](#))
- 49/025 . . {of underwater soil, e.g. with grab devices ([underwater coring E21B 25/18](#))}

- 49/04 . . using explosives in boreholes; using projectiles penetrating the wall {(drilling by use of explosives [E21B 7/007](#); gun or shaped charge perforators [E21B 43/116](#))}
- 49/06 . . with side-wall drilling tools {pressing} or scrapers
- 49/08 . Obtaining fluid samples or testing fluids, in boreholes or wells {(packers [E21B 33/12](#); valves [E21B 34/00](#); analysing pressure variations in an injection or production test [E21B 49/008](#))}
- 49/081 . . {with down-hole means for trapping a fluid sample ([E21B 49/10](#) takes precedence)}
- 49/082 . . . {Wire-line fluid samplers ([E21B 49/083](#) takes precedence)}
- 49/083 . . . {Samplers adapted to be lowered into or retrieved from a landing nipple, e.g. for testing a well without removing the drill string}
- 49/084 . . {with means for conveying samples through pipe to surface}
- 2049/085 . . {Determining specific physical fluid parameters}
- 49/086 . . {Withdrawing samples at the surface}
- 49/087 . . {Well testing, e.g. testing for reservoir productivity or formation parameters}
- 49/088 . . . {combined with sampling}
- 49/10 . . using side-wall fluid samplers or testers