

CPC COOPERATIVE PATENT CLASSIFICATION

E FIXED CONSTRUCTIONS

EARTH DRILLING; MINING

E21 EARTH DRILLING; MINING

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 in the CPC scheme. The subject matter for these IPC 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)
1/02	• Surface drives for percussion drilling
1/04	• . Devices for reversing the movement of the rod or cable at the surface {(not used, see E21B 1/02)}
3/00	Rotary drilling (drives used in the borehole E21B 4/00 ; rotary drilling machines in general B23B)
3/02	• Surface drives for rotary drilling
3/025	• . with a to-and-fro rotation of the tool
3/03	• . with an intermittent unidirectional rotation of the tool
3/035	• . with slipping or elastic transmission
3/04	• . Rotary tables {(portable drilling rigs with rotary tables E21B 7/021)}
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)}
2003/05	• . . {with a to-and-fro rotation of the drill pipe or casing}
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)

4/00

Drives used in the borehole

4/003	• {Bearing, sealing, lubricating details (for roller bits E21B 10/22 ; bearings in general F16C ; sealing in general F16J ; lubricating in general F16N)}
4/006	• {Mechanical motion converting means, e.g. reduction gearings (E21B 4/10 takes precedence; gearings in general F16H)}
4/02	• Fluid rotary type drives (hydraulic turbines for drilling wells F03B 13/02)
4/04	• Electric drives (E21B 4/12 takes precedence)
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)
4/08	• . impact being obtained by gravity only, e.g. with lost-motion connection
4/10	• . continuous unidirectional rotary motion of shaft or drilling pipe effecting consecutive impacts
4/12	• . Electrically operated hammers
4/14	• . Fluid operated hammers
4/145	• . . {of the self propelled-type, e.g. with a reverse mode to retract the device from the hole}
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
4/18	• Anchoring or feeding in the borehole

- 4/20 . combined with surface drive ([E21B 4/10](#) takes precedence)
- 6/00 Drives for combined percussion and rotary drilling (drives used in the borehole [E21B 4/00](#))**
- 6/02 . the rotation being continuous
- 6/04 . . Separate drives for percussion and rotation
- 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)}	10/25	. . . characterised by sealing details
	NOTE Special methods or apparatus for drilling without earth removal E21B 7/26	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)
7/206	. . . {using down-hole drives (down-hole drives per se E21B 4/00)}	10/28	. . with non-expandible roller cutters
7/208	. . {using down-hole drives (down-hole drives per se E21B 4/00 ; E21B 7/203 and E21B 7/206 take precedence)}	10/30	. . . Longitudinal axis roller reamers, e.g. reamer stabilisers
7/24	. Drilling using vibrating or oscillating means, e.g. out-of-balance masses (percussion drilling E21B 1/00)	10/32	. . with expandible cutting tools
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 })	10/322	. . . {cutter shifted by fluid pressure (E21B 10/345 takes precedence)}
7/265	. . {Combined with earth removal}	10/325	. . . {the cutter being shifted by a spring mechanism}
7/28	. Enlarging drilled holes, e.g. by counterboring (drill bits for enlarging the borehole E21B 10/26)	10/327	. . . {the cutter being pivoted about a longitudinal axis (E21B 10/34 takes precedence)}
7/30	. . without earth removal	10/34	. . . of roller-cutter type
	Drilling tools	10/345	. . . . {cutter shifted by fluid pressure}
10/00	Drill bits (specially adapted for deflecting the direction of boring E21B 7/064 ; with means for collecting substances E21B 27/00)	10/36	. Percussion drill bits (characterised by wear resisting parts E21B 10/46 {; with helical conveying portion E21B 10/445 })
10/003	. {with cutting edges facing in opposite axial directions}	10/38	. . characterised by conduits or nozzles for drilling fluids
10/006	. {providing a cutting edge which is self-renewable during drilling}	10/40	. . with leading portion
10/02	. Core bits (characterised by wear resisting parts E21B 10/46 ; obtaining undisturbed cores E21B 25/00)	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)
10/04	. . with core destroying means	2010/425	. . {characterised by teeth or cutter arrangement}
10/06	. . Roller core bits	10/43	. . characterised by the arrangement of teeth or other cutting elements
10/08	. Roller bits (roller core bits E21B 10/06 ; with leading portion E21B 10/26 ; characterised by wear resisting parts E21B 10/46)	10/44	. 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)
10/083	. . {with longitudinal axis, e.g. wobbling or nutating roller bit (longitudinal axis roller reamers E21B 10/30)}	10/445	. . {percussion type, e.g. for masonry (percussion drill bits in general E21B 10/36)}
10/086	. . {with eccentric movement}	10/46	. characterised by wear resisting parts, e.g. diamond inserts ({ drill bits with self-renewable cutting edge E21B 10/006 })
10/10	. . with roller axle supported at both ends (with disc-cutters E21B 10/12)	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 })
10/12	. . with discs cutters	10/485	. . . {with inserts in form of chisels, blades or the like}
10/14	. . combined with non-rolling cutters other than of leading-portion type	10/50	. . the bit being of roller type
10/16	. . characterised by tooth form or arrangement	10/52	. . . with chisel or button type inserts
10/18	. . characterised by conduits or nozzles for drilling fluids (drilling fluid supply to the bearings E21B 10/23)	10/54	. . the bit being of the rotary drag type, e.g. fork-type bits
10/20	. . characterised by detachable or adjustable parts, e.g. legs or axles (cross axle roller bits E21B 10/10)	2010/545	. . . {with blades having performed cutting elements mounted on a distinct support, e.g. polycrystalline inserts}
10/22	. . characterised by bearing, lubrication or sealing details	10/55	. . . with preformed cutting elements {with blades having preformed cutting elements mounted on a distinct support, e.g. polycrystalline inserts}
2010/225	. . . {sealing details}	10/56	. . Button type inserts (E21B 10/52 takes precedence)
10/23	. . . with drilling fluid supply to the bearings	2010/561	. . . {Inserts with performed cutting elements mounted on a distinct support, e.g. polycrystalline inserts}
10/24	. . . characterised by lubricating details	2010/562	. . . . {having a non planar or non circular cutting face}
2010/243	. . . . {with drilling fluid supply to the bearing}		
10/246	. . . . {with pumping means for feeding lubricant}		

2010/563	. . . . {having a cutting face with different segments, e.g. mosaic-type inserts}	15/02	. specially 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)
2010/564	. . . . {characterised by support details}	15/04	. specially adapted for directional drilling, e.g. slant hole rigs {(with skidding means E21B 15/003)}
2010/565	. . . . . {Interface between the substrate and the cutting element}	15/045	. . {Hydraulic, pneumatic or electric circuits for their positioning}
2010/566	. . . . {with chip breaking arrangements}	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)
10/567	. . . with preformed cutting elements mounted on a distinct support, e.g. polycrystalline inserts	17/003	. {with electrically conducting or insulating means (E21B 17/028 and E21B 17/023 take precedence)}
10/5673	. . . . {having a non planar or non circular cutting face}	17/006	. {Accessories for drilling pipes, e.g. cleaners (wear protectors E21B 17/10 ; handling drilling pipes E21B 19/00 ; thread protectors B65D 59/00)}
10/5676	. . . . {having a cutting face with different segments, e.g. mosaic-type inserts}	17/01	. 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)
10/573	. . . . characterised by support details	17/012	. . {with buoyancy elements (E21B 17/015 takes precedence)}
10/5735	. . . . . {Interface between the substrate and the cutting element}	17/015	. . {Non-vertical risers, e.g. articulated or catenary-type}
10/58	. . Chisel type inserts (E21B 10/485 , E21B 10/52 , E21B 10/54 take precedence)	17/017	. . {Bend restrictors for limiting stress on risers}
10/60	. 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)	17/02	. Couplings; joints {(expandable couplings or joints E21B 43/106)}
10/602	. . {the bit being a rotary drag type bit with blades}	17/021	. . {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)}
10/605	. . {the bit being a core-bit}	17/023	. . {Arrangements for connecting cables or wirelines to downhole devices}
2010/607	. . {characterised by the nozzle structure}	17/025	. . . {Side entry subs}
10/61	. . characterised by the nozzle structure	17/026	. . . {Arrangements for fixing cables or wirelines to the outside of downhole devices (protectors and centralisers for cables and control lines E21B 17/1035)}
10/62	. 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)	17/028	. . {Electrical or electro-magnetic connections}
2010/622	. . {with plural separable cutter elements}	17/03	. . between drilling rod or pipe and drill motor, e.g. between drilling rod and hammer
2010/624	. . . {independently attachable}	17/04	. . between rod {or the like} and bit or between rod and rod {or the like}
10/627	. . with plural detachable cutting elements	17/042	. . . threaded {(readily releasing joints E21B 17/06)}
10/633	. . . independently detachable	17/0423	. . . . {with plural threaded sections, e.g. with two-step threads}
10/64	. 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)	17/0426	. . . . {with a threaded cylindrical portion, e.g. for percussion rods}
10/66	. . the cutting element movable through the drilling pipe and laterally shiftable	17/043	. . . . with locking means
11/00	Other drilling tools {(boring grabs E21B 27/00)}	17/046	. . . with ribs, pins or jaws, and complementary grooves or the like, e.g. bayonet catches
11/005	. {Hand operated drilling tools}	17/05	. . . Swivel joints
11/02	. Boring rams (percussion drives used in the borehole E21B 4/06 ; percussion drill bits E21B 10/36)	17/06	. . . Releasing-joints, e.g. safety joints
11/06	. with driven cutting chains or similarly driven tools	17/07	. . . 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)
12/00	Accessories for drilling tools {(connecting and disconnecting drill bit and drilling pipe E21B 19/18; sharpening stone drill bits B24B 3/33)}	17/073	. . . . {with axial rotation}
12/02	. Wear indicators	17/076	. . . . {between rod or pipe and drill bit}
12/04	. Drill bit protectors	17/08	. . Casing joints
12/06	. Mechanical cleaning devices		
Other equipment or details for drilling; Well equipment or well maintenance			
15/00	Derricks; Masts; {Other supports (drill rigs with movable understructures E21B 7/02)}		
15/003	. {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)}		
15/006	. {Means for anchoring the drilling machine to the ground}		

- 17/085 . . . {Riser connections (connectors for wellhead [E21B 33/038](#))}
- 17/10 . . 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](#))
- 17/1007 . . {for the internal surface of a pipe, e.g. wear bushings for underwater well-heads}
- 17/1014 . . {Flexible or expansible centering means, e.g. with pistons pressing against the wall of the well ([E21B 17/1042](#) takes precedence)}
- 17/1021 . . . {with articulated arms or arcuate springs (measuring the diameter [E21B 47/08](#))}
- 17/1028 {with arcuate springs only, e.g. baskets with outwardly bowed strips for cementing operations}
- 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}	21/12	• using drilling pipes with plural fluid passages, e.g. closed circulation systems (pipes with plural fluid passages E21B 17/18)
19/18	• Connecting or disconnecting drill bit and drilling pipe	21/14	• using liquids and gases, e.g. foams
19/20	• Combined feeding from rack and connecting, e.g. automatically	21/16	• 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)
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)}	21/18	• Preventing exhaust air from the drill motor from blowing-off towards the working face
19/24	• Guiding or centralising devices for drilling rods or pipes	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)
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)	23/002	• {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)}
21/001	• {specially adapted for underwater drilling}	23/004	• {Indexing systems for guiding relative movement between telescoping parts of downhole tools}
21/002	• {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)}	23/006	• . {"J-slot" systems, i.e. lug and slot indexing mechanisms}
21/003	• {Means for stopping loss of drilling fluid (plastering the borehole wall E21B 33/138)}	2023/008	• {Self propelling system or apparatus, e.g. for moving tools within the horizontal portion of a borehole}
2021/005	• {using gaseous fluids}	23/01	• 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 })
2021/006	• {Underbalanced techniques, i.e. where borehole fluid pressure is below formation pressure}	23/02	• 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)
2021/007	• {Arrangements for handling drilling fluids or cuttings outside the borehole, e.g. mud boxes}	23/03	• for setting the tools into, or removing the tools from, laterally offset landing nipples or pockets
2021/008	• . {Means engaging the bore entrance, e.g. hoods for collecting dust}	23/04	• operated by fluid means, e.g. actuated by explosion (E21B 23/06 , E21B 23/08 take precedence)
21/01	• 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 })	23/06	• for setting packers
21/012	• . {using exhaust air from the drilling motor for blowing off the dust at the borehole entrance}	23/065	• . {setting tool actuated by explosion or gas generating means}
21/015	• . Means engaging the bore entrance, e.g. hoods for collecting dust	23/08	• 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)
21/02	• Swivel joints in hose-lines ({ hose connections in general F16L 31/00 , F16L 33/00 })	23/10	• . Tools specially adapted therefor
21/06	• Arrangements for treating drilling fluids outside the borehole (treating steps per se, see the relevant subclasses)	23/14	• 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)
2021/061	• . {for treating dust-loaded gaseous fluids}	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)
21/062	• . {by mixing components}	25/005	• {Above ground means for handling the core, e.g. for extracting the core from the core barrel}
21/063	• . {by separating components}	25/02	• the core receiver being insertable into, or removable from, the borehole without withdrawing the drilling pipe (retrievable drill bits E21B 10/64)
21/065	• . . {Separating solids from drilling fluids}	25/04	• . the core receiver having a core forming cutting edge or element, e.g. punch type core barrels
21/066	• . . . {with further treatment of the solids, e.g. for disposal}		
21/067	• . . {Separating gases from drilling fluids}		
21/068	• . {using chemical treatment}		
21/07	• . for treating dust-laden gaseous fluids		
21/08	• 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)		
21/10	• Valves arrangements in drilling fluid circulation systems (valves in general F16K)		
21/103	• . {Down-hole by-pass valve arrangements, i.e. between the inside of the drill string and the annulus}		
21/106	• . {Valve arrangements outside the borehole, e.g. kelly valves}		

25/06	• the core receiver having a flexible liner or inflatable retaining means	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)
25/08	• Coating, freezing, consolidating cores (E21B 25/06 takes precedence); Recovering uncontaminated cores or cores at formation pressure	31/002	• {Destroying the objects to be fished, e.g. by explosive means (cutting by explosives E21B 29/02)}
25/10	• Formed core retaining or severing means (E21B 25/06 , E21B 25/08 take precedence)	31/005	• {using vibrating or oscillating means (vibration generating arrangements for boreholes or wells E21B 28/00)}
25/12	• . of the sliding wedge type	31/007	• {fishing tools with means for attaching comprising fusing or sticking}
25/14	• . mounted on pivot transverse to core axis	31/03	• Freeing by flushing (; Controlling differential pipe sticking)
25/16	• for obtaining oriented cores	31/06	• using magnetic means
25/18	• the core receiver being specially adapted for operation under water	31/107	• using impact means for releasing stuck parts, e.g. jars (telescoping joints E21B 17/07)
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	31/1075	• . {using explosives}
27/005	• {Collecting means with a strainer}	31/113	• . hydraulically-operated
27/02	• Dump bailers, i.e. containers for depositing substances, e.g. cement or acids	31/1135	• . . {Jars with a hydraulic impedance mechanism, i.e. a restriction, for initially delaying escape of a restraining fluid}
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)}	31/12	• Grappling tools, e.g. tongs or grabs
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)	31/125	• . {specially adapted for parted wire line or ropes}
	WARNING	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)
	Group E21B 28/00 is not complete. See also E21B 43/003	31/16	• . combined with cutting or destroying means (cutting or destroying means per se E21B 29/00)
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)}	31/18	• . gripping externally, e.g. overshot
29/002	• {Cutting, e.g. milling, a pipe with a cutter rotating along the circumference of the pipe}	31/20	• . gripping internally, e.g. fishing spears
29/005	• . {with a radially-expansible cutter rotating inside the pipe, e.g. for cutting an annular window}	33/00	Sealing or packing boreholes or wells
29/007	• . {with a radially-retracting cutter rotating outside the pipe}	2033/005	• {Sealings characterised by their shape}
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)	33/02	• Surface sealing or packing
29/04	• Cutting of wire lines or the like (E21B 29/02 takes precedence)	33/03	• . Well heads; Setting-up thereof (valve arrangements therefor E21B 34/02)
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))	33/035	• . . specially adapted for underwater installations (E21B 33/043 , E21B 33/064 , E21B 33/076 take precedence)
29/08	• Cutting or deforming pipes to control fluid flow (shear type blow-out preventers E21B 33/063)	33/0355	• . . . {Control systems, e.g. hydraulic, pneumatic, electric, acoustic, for submerged well heads}
29/10	• Reconditioning of well casings, e.g. straightening	33/037	• . . . Protective housings therefor
29/12	• specially adapted for underwater installations (E21B 29/08 takes precedence)	33/0375	• . . . {Corrosion protection means (in general C23F)}
		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)
		33/0385	• . . . {electrical connectors (underwater electrical connections in general H01R 13/523)}
		33/04	• . . Casing heads; Suspending casings or tubings in well heads (setting of casings in wells E21B 43/10)
		33/0407	• . . . {with a suspended electrical cable}
		33/0415	• . . . {rotating or floating support for tubing or casing hanger}
		33/0422	• . . . {a suspended tubing or casing being gripped by a slip or an internally serrated member (slips in rotary table E21B 19/10)}

- 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](#)})
- 33/072 for cable-operated tools ([E21B 33/076](#) takes precedence)
- 33/076 specially adapted for underwater installations
- 33/08 . . Wipers; Oil savers
- 33/085 . . . {Rotatable packing means, e.g. rotating blow-out preventers}
- 33/10 . . in the borehole {(sealing the junction between main bore and laterals [E21B 41/0042](#))}
- 2033/105 . . {characterised by sealing the junction between a lateral and a main bore}
- 33/12 . . Packers; Plugs ({locking packers or plugs in landing nipples [E21B 23/02](#)}; used for cementing [E21B 33/134](#), [E21B 33/16](#))
- 33/1204 . . . {permanent; drillable}
- 33/1208 . . . {characterised by the construction of the sealing or packing means ([E21B 33/1277](#) takes precedence)}
- 33/1212 {including a metal-to-metal seal element}
- 33/1216 {Anti-extrusion means, e.g. means to prevent cold flow of rubber packing}
- 33/122 . . . Multiple string packers
- 33/124 . . . Units with longitudinally-spaced plugs for isolating the intermediate space
- 33/1243 {with inflatable sleeves}
- 33/1246 {inflated by down-hole pumping means operated by a pipe string}
- 33/126 . . . with fluid-pressure-operated elastic cup or skirt ([E21B 33/122](#), [E21B 33/124](#) take precedence)
- 33/1265 {with mechanical slips}
- 33/127 . . . with inflatable sleeve ([E21B 33/122](#), [E21B 33/124](#) take precedence)
- 33/1272 {inflated by down-hole pumping means operated by a pipe string}
- 33/1275 {inflated by down-hole pumping means operated by a down-hole drive}
- 33/1277 {characterised by the construction or fixation of the sleeve}
- 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](#)})
- 33/1285 {by fluid pressure}
- 33/129 . . . with mechanical slips for hooking into the casing ([E21B 33/122](#), [E21B 33/124](#) take precedence)
- 33/1291 {anchor set by wedge or cam in combination with frictional effect, using so-called drag-blocks ([E21B 33/1295](#) takes precedence)}
- 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}
- 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](#))
- 33/134 . . . Bridging plugs {(packers [E21B 33/12](#))}
- 33/136 . . . Baskets, e.g. of umbrella type
- 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](#))}
- 33/14 . . . for cementing casings into boreholes {(using special cement compositions [C09K 8/42](#); control of cementation quality or level [E21B 47/0005](#))}
- 33/143 {for underwater installations}
- 33/146 {Stage cementing, i.e. discharging cement from casing at different levels}
- 33/16 using plugs for isolating cement charge; Plugs therefor {(spacer compositions [C09K 8/424](#); stage cementing [E21B 33/146](#))}
- 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](#))**
- 2034/002 . {Ball valves}
- 2034/005 . {Flapper valves}
- 2034/007 . {Sleeve valves}
- 34/02 . in well heads
- 34/04 . in underwater well heads
- 34/045 . . {adapted to be lowered on a tubular string into position within a blow-out preventer stack, e.g. so-called test trees}
- 34/06 . in wells
- 34/063 . . {Valve or closure with destructible element, e.g. frangible disc ([E21B 34/103](#) takes precedence)}
- 34/066 . . {electrically actuated}

- 34/08 . . responsive to flow or pressure of the fluid obtained ([E21B 34/10 takes precedence](#))
- 34/085 . . . {with time-delay systems, e.g. hydraulic impedance mechanisms}
- 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](#))
- 34/101 . . . {with means for equalizing fluid pressure above and below the valve}
- 34/102 . . . {with means for locking the closing element in open or closed position ([E21B 34/105](#) and [E21B 34/108 take precedence](#))}
- 34/103 {with a shear pin}
- 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}
- 34/106 {the retrievable element being a secondary control fluid actuated valve landed into the bore of a first inoperative control fluid actuated valve}
- 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 . . Gravelling 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 phenomena, 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