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

**WARNINGS**

1. The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:
   - E21B 1/12 - E21B 1/38 covered by E21B 1/00
   - E21B 7/00
   - E21B 7/08
   - E21B 11/04
   - E21B 23/12
   - E21B 31/08
   - E21B 43/22
   - E21B 43/27
   - E21B 47/001-E21B 47/009
   - E21B 47/0013-E21B 47/017
   - E21B 47/0224-E21B 47/0236
   - E21B 47/047-E21B 47/053
   - E21B 47/07
   - E21B 47/085
   - E21B 47/092-E21B 47/098
   - E21B 47/103-E21B 47/117
   - E21B 47/125-E21B 47/135
   - E21B 47/20-E21B 47/24
   - E21B 47/26

2. In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

**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
   - 3/05 with a to-and-fro rotation of the tool
   - 3/03 with an intermittent unidirectional rotation of the tool
   - 3/05 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 gearing (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
Methods or apparatus for drilling

E21B

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 31/075; 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 whispocket]
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)]

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2
Methods or apparatus for drilling

E21B

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 (percuussion 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)

7/30 . . . without earth removal

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)

10/003 . . . {with cutting edges facing in opposite axial directions}

10/006 . . . [providing a cutting edge which is self-renewable during drilling]

10/02 . Core bits (characterised by wear resisting parts E21B 10/46; obtaining undisturbed cores E21B 25/00)

10/04 . . . with core destroying means

10/06 . . . Roller core bits

10/08 . Roller bits (roller core bits E21B 10/06; with leading portion E21B 10/26; characterised by wear resisting parts E21B 10/46)

10/083 . . . {with longitudinal axis, e.g. wobbling or nutating roller bit (longitudinal axis roller reamers E21B 10/30)}

10/086 . . . {with eccentric movement}

10/10 . . . with roller axle supported at both ends (with disc-cutters E21B 10/12)

10/12 . . . with discs cutters

10/14 . . . combined with non-rolling cutters other than of leading-portion type

10/16 . . . characterised by tooth form or arrangement

10/18 . . . characterised by conduits or nozzles for drilling fluids (drilling fluid supply to the bearings E21B 10/23)

10/20 . . . characterised by detachable or adjustable parts, e.g. legs or axes (cross axle roller bits E21B 10/10)

10/22 . . . characterised by bearing, lubrication or sealing details

2010/225 . . . {sealing details}

10/23 . . . with drilling fluid supply to the bearings

10/24 . . . characterised by lubricating details

2010/243 . . . {with drilling fluid supply to the bearing}

10/246 . . . {with pumping means for feeding lubricant}

10/25 . . . characterised by sealing details

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)

10/28 . . . with non-expansible roller cutters

10/30 . . . Longitudinal axis roller reamers, e.g. reamer stabilisers

10/32 . . . with expansible cutting tools

10/322 . . . {cutter shifted by fluid pressure (E21B 10/345 takes 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}

10/36 . Percussion drill bits (characterised by wear resisting parts E21B 10/46; with helical conveying portion E21B 10/445)

10/38 . . . characterised by conduits or nozzles for drilling fluids

10/40 . . . with leading portion

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)

2010/425 . . . {characterised by teeth or cutter arrangement}

10/43 . . . characterised by the arrangement of teeth or other cutting elements

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 10/22)

10/445 . . . {percussion type, e.g. for masonry (percussion drill bits in general E21B 10/36)}

10/46 . . . characterised by wear resisting parts, e.g. diamond inserts (drill bits with self-renewable cutting edge E21B 10/006)

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) }

10/485 . . . {with inserts in form of chisels, blades or the like}

10/50 . . . the bit being of roller type

10/52 . . . with chisel or button type inserts

10/54 . . . the bit being of the rotary drag type, e.g. fork-type bits

2010/545 . . . {with blades having performed cutting elements mounted on a distinct support, e.g. polycrystalline inserts}

10/55 . . . with preformed cutting elements {with blades having preformed cutting elements mounted on a distinct support, e.g. polycrystalline inserts}

10/56 . Button type inserts (E21B 10/52 takes precedence)

2010/561 . . . {Inserts with performed cutting elements mounted on a distinct support, e.g. polycrystalline inserts}
Drilling tools

2010/562 . . . . [having a non planar or non circular cutting face]
2010/563 . . . . . [having a cutting face with different segments, e.g. mosaic-type inserts]
2010/564 . . . . . [characterised by support details]
2010/565 . . . . . [Interface between the substrate and the cutting element]
2010/566 . . . . . [with chip breaking arrangements]
10/567 . . . . . with preformed cutting elements mounted on a distinct support, e.g. polycrystalline inserts
10/5673 . . . . . [having a non planar or non circular cutting face]
10/5676 . . . . . [having a cutting face with different segments, e.g. mosaic-type inserts]
10/573 . . . . . [characterised by support details]
10/5735 . . . . . [Interface between the substrate and the cutting element]
10/58 . . . . Chisel type inserts ([E21B 10/485, E21B 10/52, E21B 10/54 take precedence])
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)
10/602 . . . . [the bit being a rotary drag type bit with blades]
10/605 . . . . [the bit being a core-bit]
2010/607 . . . . [characterised by the nozzle structure]
10/61 . . . . characterised by the nozzle structure
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)
2010/622 . . . . [with plural separable cutter elements]
2010/624 . . . . [independently attachable]
10/627 . . . . [with plural detachable cutting elements]
10/633 . . . . [independently detachable]
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)
10/66 . . . . the cutting element movable through the drilling pipe and laterally shiftable

11/00 Other drilling tools ([boring grabs E21B 27/00])
11/005 . . . . [Hand operated drilling tools]
11/02 . . . . Boring rams (percussion drives used in the borehole E21B 4/06; percussion drill bits E21B 10/36)
11/06 . . . . with driven cutting chains or similarly driven tools

12/00 Accessories for drilling tools (including tapping or disconnecting drill bit and drilling pipe E21B 19/18; sharpening stone drill bits B24B 3/33)
12/02 . . . . Wear indicators
12/04 . . . . Drill bit protectors
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]
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])
15/04 . . . . specially adapted for directional drilling, e.g. slant hole rigs ([with skidding means E21B 15/003])
15/045 . . . . [Hydraulic, pneumatic or electric circuits for their positioning]

17/00 Drilling rods or pipes; Flexible drill strings; Kellies; Drill collars; Sucker rods; Cables; Casings; Tubings (rod couplings in general F16D; tube couplings in general F16L)
17/003 . . . . [with electrically conducting or insulating means (E21B 17/028 and E21B 17/023 take precedence)]
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)]
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]
17/012 . . . . [with buoyancy elements (E21B 17/015 takes precedence)]
17/015 . . . . [Non-vertical risers, e.g. articulated or catenary-type]
17/017 . . . . [Bend restrictors for limiting stress on risers]
17/02 . . . . Couplings; joints ([expandable couplings or joints E21B 43/106])
17/023 . . . . [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)]
17/023 . . . . [Arrangements for connecting cables or wirelines to downhole devices]
17/025 . . . . [Side entry subs]
17/026 . . . . [Arrangements for fixing cables or wirelines to the outside of downhole devices (protectors and centralisers for cables and control lines E21B 17/035)]
17/028 . . . . [Electrical or electro-magnetic connections]
17/03 . . . . between drilling rod or pipe and drill motor, e.g. between drilling rod and hammer
17/04 . . . . between rod [or the like] and bit or between rod and rod [or the like]
17/042 . . . . threaded ([readily releasing joints E21B 17/06])
17/0423 . . . . [with plural threaded sections, e.g. with two-step threads]
17/0426 . . . . [with a threaded cylindrical portion, e.g. for percussion rods]
17/043 . . . . [with locking means]
17/046 . . . . [with ribs, pins or jaws, and complementary grooves or the like, e.g. bayonet catches]
17/05 . . . . Swivel joints
17/06 . . . . Releasing-joints, e.g. safety joints
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)
17/073 . . . . [with axial rotation]
17/076 . . . . [between rod or pipe and drill bit]  
17/08 . . . Casing joints  
17/085 . . . . [Riser connections (connectors for wellhead E21B 33/038)]  
17/10 . . Wear protectors; Centralising devices, e.g. centralisers (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 expandable 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 11/27)]  
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 100; 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 304; 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]
Other equipment or details for drilling; Well equipment or well maintenance

E21B

21/00 Methods or apparatus for flushing boreholes, e.g. by use of exhaust air from motor (freezing objects stuck in boreholes by flushing E21B 31/03; well drilling compositions C09K 8/02)

21/001 . [specially adapted for underwater drilling]

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)]

21/003 . [Means for stopping loss of drilling fluid (plastering the borehole wall E21B 33/138)]

21/005 . [using gaseous fluids]

21/006 . [Underbalanced techniques, i.e. where borehole fluid pressure is below formation pressure]

21/007 . [Arrangements for handling drilling fluids or cuttings outside the borehole, e.g. mud boxes]

21/008 . . [Means engaging the bore entrance, e.g. hoods for collecting dust]

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)]

21/012 . . [using exhaust air from the drilling motor for blowing off the dust at the borehole entrance]

21/015 . . Means engaging the bore entrance, e.g. hoods for collecting dust

21/02 . Swivel joints in hose-lines (hose connections in general F16L 31/00; F16L 33/00)

21/06 . Arrangements for treating fluids outside the borehole (treating steps per se, see the relevant subclasses)

21/061 . . . [for treating dust-loaded gaseous fluids]

21/062 . . . [by mixing components]

21/063 . . . [by separating components]

21/065 . . . . [Separating solids from drilling fluids]

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]

21/12 . using drilling pipes with plural fluid passages, e.g. closed circulation systems (pipes with plural fluid passages E21B 17/18)

21/14 . using liquids and gases, e.g. foams

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)

21/18 . 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 . . [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)]

23/004 . . [Indexing systems for guiding relative movement between telescoping parts of downhole tools]

23/006 . . . . ["J-slot" systems, i.e. lug and slot indexing mechanisms]

2023/008 . . . [Self propelling system or apparatus, e.g. for moving tools within the horizontal portion of a borehole]

23/01 . . for anchoring the tools or the like (E21B 23/03 - E21B 23/06 take precedence; anchoring of drives in the borehole E21B 4/18; packers E21B 33/12)

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)

23/03 . . for setting the tools into, or removing the tools from, laterally offset landing nipples or pockets

23/04 . . operated by fluid means, e.g. actuated by explosion (E21B 23/06, E21B 23/08 take precedence)

23/06 . . for setting packers

23/065 . . . [setting tool actuated by explosion or gas generating means]

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]

23/10 . . . [Tools specially adapted therefor]

23/14 . . for displacing a cable or cable-operated tool, e.g. for logging or perforating operations in deviated wells (side entry sub E21B 17/005; control line protectors E21B 17/0035; by fluid pressure E21B 23/08; provision on well heads for introducing or removing cable-operated tools E21B 33.172; E21B 33.176)

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)

25/005 . . [Above ground means for handling the core, e.g. for extracting the core from the core barrel]

25/02 . . the core receiver being insertable into, or removable from, the borehole without withdrawing the drilling pipe (retrievable drill bits E21B 10/64)

25/04 . . . the core receiver having a core forming cutting edge or element, e.g. punch type core barrels
Other equipment or details for drilling; Well equipment or well maintenance  E21B

25/06 . the core receiver having a flexible liner or inflatable retaining means
25/08 . Coating, freezing, consolidating cores (E21B 25/06 takes precedence); Recovering unconsolidated cores or cores at formation pressure
25/10 . Formed core retaining or severing means (E21B 25/06, E21B 25/08 take precedence)
25/12 . of the sliding wedge type
25/14 . mounted on pivot transverse to core axis
25/16 . for obtaining oriented cores
25/18 . the core receiver being specially adapted for operation under water

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

27/005 . (Collecting means with a strainer)
27/02 . Dump bailers, i.e. containers for depositing substances, e.g. cement or acids
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)

28/00 Vibration generating arrangements for boreholes or wells, e.g. for stimulating production (for drilling E21B 7/24; for fishing or freeing objects E21B 31/005; for transmitting measuring-signals E21B 47/14; for geophysical measurements G01V 1/02)

**WARNING**
Group E21B 28/00 is not complete. See also E21B 43/003

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)

29/002 . [Cutting, e.g. milling, a pipe with a cutter rotating along the circumference of the pipe]
29/005 . . . (with a radially-expansible cutter rotating inside the pipe, e.g. for cutting an annular window)
29/007 . . . (with a radially-retracting cutter rotating outside the pipe)
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)
29/04 . Cutting of wire lines or the like (E21B 29/02 takes precedence)
29/06 . Cutting windows, e.g. directional window cutters for whispstock operations ([E21B 29/005 and] E21B 29/08 take precedence ; whispstocks E21B 7/061)
29/08 . Cutting or deforming pipes to control fluid flow (shear type blow-out preventers E21B 33/063)
29/10 . Reconditioning of well casings, e.g. straightening specially adapted for underwater installations (E21B 29/08 takes precedence)

31/00 Fishing 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

31/002 . [Destroying the objects to be fished, e.g. by explosive means (cutting by explosives E21B 29/02)]
31/005 . [using vibrating or oscillating means (vibration generating arrangements for boreholes or wells E21B 28/00)]
31/007 . [Fishing tools with means for attaching comprising fusing or sticking]
31/03 . Freeing by flushing ; Controlling differential pipe sticking
31/06 . using magnetic means
31/107 . using impact means for releasing stuck parts, e.g. jars (telescoping joints E21B 17/07)
31/1075 . . . (using explosives)
31/113 . . . hydraulically-operated
31/1135 . . . (Jars with a hydraulic impedance mechanism, i.e. a restriction, for initially delaying escape of a restraining fluid)
31/12 . Grappling tools, e.g. tongs or grabs
31/125 . . . (specially adapted for parted wire line or ropes)
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)
31/16 . . combined with cutting or destroying means (cutting or destroying means per se E21B 29/00)
31/18 . . . gripping externally, e.g. overshot
31/20 . . . gripping internally, e.g. fishing spears

33/00 Sealing or packing boreholes or wells

2033/005 . . . (Sealings characterised by their shape)
33/02 . Surface sealing or packing
33/03 . . . Well heads; Setting-up thereof (valve arrangements therefor E21B 34/02)
33/035 . . . specially adapted for underwater installations (E21B 33/043, E21B 33/064, E21B 33/076 take precedence)
33/0355 . . . . . . . (Control systems, e.g. hydraulic, pneumatic, electric, acoustic, for submerged well heads)
33/037 . . . . . Protective housings therefor
33/0375 . . . . . . (Corrosion protection means (in general C23E))
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 33/040)

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 33/035; [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 33/127 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 (E21B 33/121, E21B 33/1295 take precedence)]

33/1293 . . . [with means for anchoring against downward and upward movement (E21B 33/121, 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 fractionally engaging the inner wall of the well]

33/13 . . . Methods or devices for cementing, for plugging holes, crevices, or the like (dump bailers E21B 22/02; [methods or apparatus for grouting offshore structures E21B 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]}
Other equipment or details for drilling; Well equipment or well maintenance

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 (E21B 34/105 and E21B 34/108 take precedence)
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 34/06 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 E16B)
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 40/000
41/007  . [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; perforating 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 B65C 11/00)
Other equipment or details for drilling; Well equipment or well maintenance

E21B

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 E42B 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)]
Obtaining fluids from wells

Obtaining a slurry of minerals, e.g. by using nozzles arrangements for wells E21B 36/00 takes precedence; heating, cooling or insulating Melting minerals, e.g. sulfur (E21B 43/24) extendable nozzles E21B 43/292 by an alkaline or acid leaching agent (E21B 43/241) Dissolving minerals other than hydrocarbons, e.g. E21B 43/003 by vibrating earth formations; chemical compositions therefor C09K 8/592) Methods for stimulating production (dump bailers; vibration generating arrangements {using steerable or laterally extendable nozzles} in association with a fracturing process) {using heat (heating, cooling or insulating wells) treatment fluid into the formation} including the injection of a gaseous medium as with organic material C09K 8/592 or insulating wells E21B 36/00 using heat, e.g. steam injection (heating, cooling) Displacing by water (E21B 43/2405 fracturing or otherwise attacking the formation SAGD in combination with other methods (E21B 43/2403)) Combustion in situ oil shale combined with solution mining of non-hydrocarbon minerals, e.g. solvent pyrolysis of oil shale Combustion in situ in association with fracturing processes (or crevice forming processes) using explosives 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) (including the injection of a gaseous medium as treatment fluid into the formation) by forming crevices or fractures {chemical compositions therefor C09K 8/62}) Separate steps of (1) cementing, plugging or consolidating and (2) fracturing or attacking the formation) using explosives {combustion in situ using explosives E21B 43/248) by means of nuclear energy (peaceful applications of nuclear explosive devices in general G21J 3/00) reinforcing fractures by propping {chemical compositions therefor C09K 8/80}) 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)) (using heat (heating, cooling or insulating wells E21B 36/00)) in association with a fracturing process Melting minerals, e.g. sulfur (E21B 43/24 takes precedence; heating, cooling or insulating arrangements for wells E21B 36/00) Obtaining a slurry of minerals, e.g. by using nozzles using steerable or laterally extendable nozzles

WARNING
Not complete pending a reorganisation. See also E21B 43/24 and subgroups

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... Repressing 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]

43/255... [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) 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 sc. 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 19/29; 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 47/006)]
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)
Automatic control, surveying or testing

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 17/014) 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 47/01

47/011  .  [Protecting measuring instruments (cooling or insulating arrangements for boreholes or wells E21B 36/00)]
47/012  .  Determining slope or direction (clinometers or direction meters G01C)
47/0122  .  of the borehole, [e.g. using geomagnetism]
47/012208  .  [using seismic or acoustic means]
47/012216  .  [using at least one source of electromagnetic energy and at least one detector therefor]
47/012224  .  .  .  .  [at least one of the sources or one of the detectors being located above ground]
47/01232  .  [using a pendulum]
47/0124  .  .  .  .  of devices in the borehole (E21B 47/022 takes precedence)
47/0126  .  .  .  .  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 telerrecorders for level of liquids] G01E; 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; telerrecorders 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 27/22)]
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 G01E; 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 raditions]
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