

CPC**COOPERATIVE PATENT CLASSIFICATION****E21B**

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

WARNING

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

[E21B 1/12](#) to [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 23/00D](#)
[E21B 31/08](#) covered by [E21B 27/00](#)
[E21B 43/22](#) covered by [C09K 8/58](#)

Guidance heading: **Methods or apparatus for drilling**

E21B 1/00 **Percussion drilling** (drives used in the borehole [E21B 4/00](#); rotary drilling machines in general [B23B](#))

- [E21B 1/02](#) . Surface drives for percussion drilling
- [E21B 1/04](#) . . Devices for reversing the movement of the rod or cable at the surface {not used, see [E21B 1/02](#) }

E21B 3/00 **Rotary drilling** (drives used in the borehole [E21B 4/00](#); rotary drilling machines in general [B23B](#))

- [E21B 3/02](#) . Surface drives for rotary drilling
- [E21B 3/025](#) . . with a to-and-fro rotation of the tool
- [E21B 3/03](#) . . with an intermittent unidirectional rotation of the tool
- [E21B 3/035](#) . . with slipping or elastic transmission
- [E21B 3/04](#) . . Rotary tables { (portable drilling rigs with rotary tables [E21B 7/021](#)) }
- [E21B 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](#)) }
- [E21B 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](#))

E21B 4/00 **Drives used in the borehole**

- [E21B 4/003](#) . {Bearing, sealing, lubricating details (for roller bits [E21B 10/22](#); bearings in general [F16C](#) ; sealing in general [F16J](#) ; lubricating in general [F16N](#)) }

- E21B 4/006 . {Mechanical motion converting means, e.g. reduction gearings ([E21B 4/10](#) takes precedence; gearings in general [F16H](#)) }
- E21B 4/02 . Fluid rotary type drives (hydraulic turbines for drilling wells [F03B 13/02](#))
- E21B 4/04 . Electric drives ([E21B 4/12](#) takes precedence)
- E21B 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](#))
- E21B 4/08 . . impact being obtained by gravity only, e.g. with lost-motion connection
- E21B 4/10 . . continuous unidirectional rotary motion of shaft or drilling pipe effecting consecutive impacts
- E21B 4/12 . . Electrically operated hammers
- E21B 4/14 . . Fluid operated hammers
- E21B 4/145 . . . {of the self propelled-type, e.g. with a reverse mode to retract the device from the hole }
- E21B 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
- E21B 4/18 . Anchoring or feeding in the borehole
- E21B 4/20 . combined with surface drive ([E21B 4/10](#) takes precedence)
- E21B 6/00** **Drives for combined percussion and rotary drilling** (drives used in the borehole [E21B 4/00](#))
- E21B 6/02 . the rotation being continuous
- E21B 6/04 . . Separate drives for percussion and rotation
- E21B 6/06 . the rotation being intermittent, e.g. obtained by ratchet device
- E21B 6/08 . . Separate drives for percussion and rotation
- E21B 7/00** **Special methods or apparatus for drilling**
- E21B 7/001 . {Drilling a non circular hole (excavating trenches [E02F 5/02](#); cutting machines for slitting [E21C 25/00](#)) }
- E21B 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) }
- E21B 7/003 . {Drilling with mechanical conveying means (bailers, e.g. baskets, buckets [E21B 27/00](#); tunnelling [E21D](#)) }
- E21B 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](#)) }
- E21B 7/006 . . . { combined with a bucket-type container (bailers with helical conveying means [E21B 27/04](#)) }
- E21B 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 [31/107B](#); gun or shaped-charge perforators [E21B 43/116](#); fracturing by explosives [E21B 43/263](#), [E21B 43/248](#); taking samples using explosives [E21B 49/04](#) }

- E21B 7/008 . {Drilling ice or a formation covered by ice }
- E21B 7/02 . Portable drilling rigs, truck-or skid-mounted, with their own drive (portable drilling rigs for use on underwater floors [E21B 7/124](#))
- E21B 7/021 .. {With a rotary table, i.e a fixed rotary drive for a relatively advancing tool (rotary tables [E21B 3/04](#)) }
- E21B 7/022 .. { Control of the drilling operation; Hydraulic or pneumatic means for activation or operation (control circuits for drilling masts [E21B 15/045](#)) }
- E21B 7/023 .. { the mast being foldable or telescopically retractable }
- E21B 7/024 .. { having means for adapting to inclined terrain; having means for stabilizing the vehicle while drilling }
- E21B 7/025 .. { Rock drills, i.e. jumbo drills }
- E21B 7/026 .. { having auxiliary platforms, e.g. for observation purposes }
- E21B 7/027 .. { Drills for drilling shallow holes, e.g. for taking soil samples or for drilling postholes }
- E21B 7/028 ... { the drilling apparatus being detachable from the vehicle, e.g. hand portable drills }
- E21B 7/04 . Directional drilling (derricks or masts specially adapted therefor [E21B 15/04](#))
- E21B 7/043 .. {for underwater installations }
- E21B 7/046 .. {horizontal drilling (drilling with mechanical conveying means [E21B 7/003](#)) }
- E21B 7/06 .. Deflecting the direction of boreholes { (directional window cutting [E21B 29/06](#); deflecting the direction of fishing tools [E21B 31/14](#)) }
- E21B 7/061 ... {the tool shaft advancing relative to a guide, e.g. a curved tube or a whipstock }
- E21B 7/062 ... {the tool shaft rotating inside a non-rotating guide travelling with the shaft ([E21B 7/067](#) and [E21B 7/068](#) take precedence) }
- E21B 7/064 ... {specially adapted drill bits therefor }
- E21B 7/065 ... {using oriented fluid jets }
- E21B 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 }
- E21B 7/068 ... {drilled by a down-hole drilling motor (down-hole drives per se [E21B 4/00](#), [E21B 7/067](#) takes precedence) }
- E21B 7/10 .. Correction of deflected boreholes
- E21B 7/12 . Underwater drilling (derricks or masts specially adapted therefor [E21B 15/02](#); telescoping joints [E21B 17/07](#); using heave compensators [E21B 19/09](#))
- E21B 7/122 .. {with submersible vertically movable guide }
- E21B 7/124 .. with underwater tool drive prime mover, e.g. portable drilling rigs for use on underwater floors
- E21B 7/1245 ... {using explosive means (Anchors driven in by explosive charges [B63B 21/28](#)) }
- E21B 7/128 .. from floating support with independent underwater anchored guide base {guide line systems [E21B 33/035F](#) }
- E21B 7/132 .. from underwater buoyant support

- E21B 7/136 . . from non-buoyant support ([E21B 7/124](#) takes precedence)
- E21B 7/14 . Drilling by use of heat, e.g. flame drilling { (by use of explosives [E21B 7/007](#)) }
- E21B 7/143 . . {underwater }
- E21B 7/146 . . {Thermal lances }
- E21B 7/15 . . of electrically generated heat
- E21B 7/16 . Applying separate balls or pellets by the pressure of the drill, so-called shot-drilling
- E21B 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](#))
- E21B 7/185 . . {underwater }
- E21B 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](#) })
- E21B 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](#)) }
- E21B 7/203 . . . {using down-hole drives (down-hole drives per se [E21B 4/00](#)) }
- E21B 7/205 . . { without earth removal ([E21B 7/30](#) takes precedence) }

NOTE

Special methods or apparatus for drilling without earth removal [E21B 7/26](#)

- E21B 7/206 . . . {using down-hole drives (down-hole drives per se [E21B 4/00](#)) }
- E21B 7/208 . . {using down-hole drives (down-hole drives per se [E21B 4/00](#); [E21B 7/203](#) and [E21B 7/206](#) take precedence) }
- E21B 7/24 . Drilling using vibrating or oscillating means, e.g. out-of-balance masses (percussion drilling [E21B 1/00](#))
- E21B 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](#) })
- E21B 7/265 . . {Combined with earth removal }
- E21B 7/28 . Enlarging drilled holes, e.g. by counterboring (drill bits for enlarging the borehole [E21B 10/26](#))
- E21B 7/30 . . without earth removal

Guidance heading: Drilling tools

- E21B 10/00** **Drill bits** (specially adapted for deflecting the direction of boring [E21B 7/064](#); with means for collecting substances [E21B 27/00](#))
- E21B 10/003 . {with cutting edges facing in opposite axial directions }

- E21B 10/006 . {providing a cutting edge which is self-renewable during drilling }
- E21B 10/02 . Core bits (characterised by wear resisting parts [E21B 10/46](#); obtaining undisturbed cores [E21B 25/00](#))
- E21B 10/04 . . with core destroying means
- E21B 10/06 . . Roller core bits
- E21B 10/08 . Roller bits (roller core bits [E21B 10/06](#); with leading portion [E21B 10/26](#); characterised by wear resisting parts [E21B 10/46](#))
- E21B 10/083 . . {with longitudinal axis, e.g. wobbling or nutating roller bit (longitudinal axis roller reamers [E21B 10/30](#)) }
- E21B 10/086 . . {with excentric movement }
- E21B 10/10 . . with roller axle supported at both ends (with disc-cutters [E21B 10/12](#))
- E21B 10/12 . . with discs cutters
- E21B 10/14 . . combined with non-rolling cutters other than of leading-portion type
- E21B 10/16 . . characterised by tooth form or arrangement
- E21B 10/18 . . characterised by conduits or nozzles for drilling fluids (drilling fluid supply to the bearings [E21B 10/23](#))
- E21B 10/20 . . characterised by detachable or adjustable parts, e.g. legs or axles (cross axle roller bits [E21B 10/10](#))
- E21B 10/22 . . characterised by bearing, lubrication or sealing details
- E21B 10/23 . . . with drilling fluid supply to the bearings
- E21B 10/24 . . . characterised by lubricating details
- E21B 10/246 . . . {with pumping means for feeding lubricant }
- E21B 10/25 . . . characterised by sealing details
- E21B 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](#))
- E21B 10/28 . . with non-expansible roller cutters
- E21B 10/30 . . . Longitudinal axis roller reamers, e.g. reamer stabilisers
- E21B 10/32 . . with expansible cutting tools
- E21B 10/322 . . . {cutter shifted by fluid pressure ([E21B 10/345](#) takes precedence) }
- E21B 10/325 . . . {the cutter being shifted by a spring mechanism }
- E21B 10/327 . . . {the cutter being pivoted about a longitudinal axis ([E21B 10/34](#) takes precedence) }
- E21B 10/34 . . . of roller-cutter type
- E21B 10/345 . . . {cutter shifted by fluid pressure }
- E21B 10/36 . Percussion drill bits (characterised by wear resisting parts [E21B 10/46](#)) {with helical conveying portion [E21B 10/445](#) }
- E21B 10/38 . . characterised by conduits or nozzles for drilling fluids
- E21B 10/40 . . with leading portion
- E21B 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](#))

- E21B 10/43 .. characterised by the arrangement of teeth or other cutting elements
- E21B 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](#))
- E21B 10/445 .. {percussion type, e.g. for masonry (percussion drill bits in general [E21B 10/36](#)) }
- E21B 10/46 . characterised by wear resisting parts, e.g. diamond inserts { (drill bits with self-renewable cutting edge [E21B 10/006](#)) }
- E21B 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](#)) }
- E21B 10/485 ... {with inserts in form of chisels, blades or the like }
- E21B 10/50 .. the bit being of roller type
- E21B 10/52 ... with chisel or button type inserts
- E21B 10/54 .. the bit being of the rotary drag type, e.g. fork-type bits
- E21B 10/55 ... with preformed cutting elements { with blades having preformed cutting elements mounted on a distinct support, e.g. polycrystalline inserts }
- E21B 10/56 .. Button type inserts ([E21B 10/52](#) takes precedence)
- E21B 10/567 ... with preformed cutting elements mounted on a distinct support, e.g. polycrystalline inserts
- E21B 10/5673 { having a non planar or non circular cutting face ([E21B 10/571](#) takes precedence) }
- E21B 10/5676 { having a cutting face with different segments, e.g. mosaic-type inserts }
- E21B 10/573 characterised by support details
- E21B 10/5735 { Interface between the substrate and the cutting element }
- E21B 10/58 .. Chisel type inserts ({[E21B 10/485](#), } [E21B 10/52](#), [E21B 10/54](#) take precedence)
- E21B 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](#) })
- E21B 10/602 .. {the bit being a rotary drag type bit with blades }
- E21B 10/605 .. {the bit being a core-bit }
- E21B 10/61 .. characterised by the nozzle structure
- E21B 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](#))
- E21B 10/627 .. with plural detachable cutting elements
- E21B 10/633 ... independently detachable
- E21B 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](#))
- E21B 10/66 .. the cutting element movable through the drilling pipe and laterally shiftable
- E21B 11/00 Other drilling tools { (boring grabs [E21B 27/00](#)) }**
- E21B 11/005 . {Hand operated drilling tools }
- E21B 11/02 . Boring rams (percussion drives used in the borehole [E21B 4/06](#); percussion drill bits

[E21B 10/36](#))

- E21B 11/06 . with driven cutting chains or similarly driven tools

E21B 12/00 **Accessories for drilling tools** { (connecting and disconnecting drill bit and drilling pipe [E21B 19/18](#); sharpening stone drill bits [B24B 3/33](#)) }

- E21B 12/02 . Wear indicators
- E21B 12/04 . Drill bit protectors
- E21B 12/06 . Mechanical cleaning devices

Guidance heading: **Other equipment or details for drilling; Well equipment or well maintenance**

E21B 15/00 **Derricks; Masts; {Other supports (drill rigs with movable understructures [E21B 7/02](#)) }**

- E21B 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](#)) }
- E21B 15/006 . {Means for anchoring the drilling machine to the ground }
- E21B 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](#) })
- E21B 15/04 . specially adapted for directional drilling, e.g. slant hole rigs { (with skidding means [E21B 15/003](#)) }
- E21B 15/045 . . {Hydraulic, pneumatic or electric circuits for their positioning }

E21B 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](#))**

- E21B 17/003 . {with electrically conducting or insulating means ([E21B 17/028](#) and [E21B 17/023](#) take precedence) }
- E21B 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](#)) }
- E21B 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](#))
- E21B 17/012 . . {with buoyancy elements ([E21B 17/015](#) takes precedence) }
- E21B 17/015 . . {Non-vertical risers, e.g. articulated or catenary-type }
- E21B 17/017 . . {Bend restrictors for limiting stress on risers }
- E21B 17/02 . Couplings; joints { Expandable couplings or joints [E21B 43/106](#) }

- E21B 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](#)) }
- E21B 17/023 .. { Arrangements for connecting cables or wirelines to downhole devices }
- E21B 17/025 ... { Side entry subs }
- E21B 17/026 ... { Arrangements for fixing cables or wirelines to the outside of downhole devices (protectors and centralisers for cables and control lines [E21B 17/10D](#)) }
- E21B 17/028 .. { Electrical or electro-magnetic connections }
- E21B 17/03 .. between drilling rod or pipe and drill motor, e.g. between drilling rod and hammer
- E21B 17/04 .. between rod {or the like } and bit or between rod and rod {or the like }
- E21B 17/042 ... threaded { (readily releasing joints [E21B 17/06](#)) }
- E21B 17/0423 {with plural threaded sections, e.g. with two-step threads }
- E21B 17/0426 {with a threaded cylindrical portion, e.g. for percussion rods }
- E21B 17/043 with locking means
- E21B 17/046 ... with ribs, pins or jaws, and complementary grooves or the like, e.g. bayonet catches
- E21B 17/05 ... Swivel joints
- E21B 17/06 ... Releasing-joints, e.g. safety joints
- E21B 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](#) })
- E21B 17/073 {with axial rotation }
- E21B 17/076 {between rod or pipe and drill bit }
- E21B 17/08 .. Casing joints
- E21B 17/085 ... {Riser connections (connectors for wellhead [E21B 33/038](#)) }
- E21B 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](#))
- E21B 17/1007 .. {for the internal surface of a pipe, e.g. wear bushings for underwater well-heads }
- E21B 17/1014 .. {Flexible or expansible centering means, e.g. with pistons pressing against the wall of the well ([E21B 17/1042](#) takes precedence) }
- E21B 17/1021 ... {with articulated arms or arcuate springs (measuring the diameter [E21B 47/08](#)) }
- E21B 17/1028 {with arcuate springs only, e.g. baskets with outwardly bowed strips for cementing operations }
- E21B 17/1035 .. {for plural rods, pipes or lines, e.g. for control lines }
- E21B 17/1042 .. {Elastomer protector or centering means }
- E21B 17/105 ... {split type }
- E21B 17/1057 .. {Centralising devices with rollers or with a relatively rotating sleeve ([E21B 17/1014](#) takes precedence) }
- E21B 17/1064 ... {Pipes or rods with a relatively rotating sleeve }
- E21B 17/1071 .. { specially adapted for pump rods, e.g. sucker rods }
- E21B 17/1078 .. { Stabilisers or centralisers for casing, tubing or drill pipes (devices for off-center positioning [E21B 17/10](#); [E21B 17/1007](#) to [E21B 17/1064](#) take precedence) }
- E21B 17/1085 .. { Wear protectors; Blast joints; Hard facing (wear protection included in centralising devices, see relevant subgroups) }

- E21B 17/1092 . . { Gauge section of drill bits }
- E21B 17/12 . . Devices for placing or drawing out wear protectors
- E21B 17/14 . Casing shoes {for the protection of the bottom of the casing }
- E21B 17/16 . Drill collars
- E21B 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 })
- E21B 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) }
- E21B 17/203 . . {with plural fluid passages }
- E21B 17/206 . . {with conductors, e.g. electrical, optical (hoses with electrically conducting means
in general F16L 11/127) }
- E21B 17/22 . Rods or pipes with helical structure (drill bits with helical conveying portion
E21B 10/44)
- E21B 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)**
- E21B 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) }
- E21B 19/004 . . {supporting a riser from a drilling or production platform }
- E21B 19/006 . . . {including heave compensators }
- E21B 19/008 . {Winding units, specially adapted for drilling operations (capstans, winches B66D ;
cathead actuated pipe wrenches or spinners E21B 19/162) }
- E21B 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)
- E21B 19/04 . . Hooks
- E21B 19/06 . . Elevators, i.e. rod or tube gripping devices
- E21B 19/07 . . . Slip-type elevators (slips E21B 19/10)
- E21B 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
- E21B 19/081 . . Screw-and-nut feed mechanisms
- E21B 19/083 . . Cam, rack or like feed mechanisms
- E21B 19/084 . . with flexible drawing means, e.g. cables
- E21B 19/086 . . with a fluid-actuated cylinder (E21B 19/084, E21B 19/087, E21B 19/09 take
precedence)
- E21B 19/087 . . by means of a swinging arm
- E21B 19/089 . . with a spring or an additional weight
- E21B 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 })

- E21B 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](#)) }
- E21B 19/12
 - Rope clamps (rope clamps in general [F16G 11/00](#)) {rod, casings or tube clamps not secured to elevators }
- E21B 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](#) })
- E21B 19/143
 - .. {specially adapted for underwater drilling }
- E21B 19/146
 - .. {Carousel systems, i.e. rotating rack systems }
- E21B 19/15
 - .. Racking of rods in horizontal position; Handling between horizontal and vertical position
- E21B 19/155
 - ... {Handling between horizontal and vertical position }
- E21B 19/16
 - Connecting or disconnecting pipe couplings or joints ([E21B 19/20](#) takes precedence; Pipe wrenches or the like [B25B](#))
- E21B 19/161
 - .. {using a wrench or a spinner adapted to engage a circular section of pipe ([E21B 19/168](#) takes precedence) }
- E21B 19/162
 - ... {cathead actuated }
- E21B 19/163
 - ... {piston-cylinder actuated }
- E21B 19/164
 - ... {motor actuated ([E21B 19/162](#) and [E21B 19/163](#) take precedence) }
- E21B 19/165
 - .. {Control or monitoring arrangements therefor }
- E21B 19/166
 - ... {Arrangements of torque limiters or torque indicators }
- E21B 19/167
 - .. {using a wrench adapted to engage a non circular section of pipe, e.g. a section with flats or splines }
- E21B 19/168
 - .. {using a spinner with rollers or a belt adapted to engage a well pipe }
- E21B 19/18
 - Connecting or disconnecting drill bit and drilling pipe
- E21B 19/20
 - Combined feeding from rack and connecting, e.g. automatically
- E21B 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](#)) }
- E21B 19/24
 - Guiding or centralising devices for drilling rods or pipes
- E21B 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](#))**
- E21B 21/001
 - {specially adapted for underwater drilling }
- E21B 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](#)) }
- E21B 21/003
 - {Means for stopping loss of drilling fluid (plastering the borehole wall [E21B 33/138](#)) }
- E21B 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](#) })
- [E21B 21/012](#) . . { using exhaust air from the drilling motor for blowing off the dust at the borehole entrance }
- [E21B 21/015](#) . . Means engaging the bore entrance, e.g. hoods for collecting dust
- [E21B 21/02](#) . Swivel joints in hose-lines { (hose connections in general [F16L 31/00](#), [F16L 33/00](#)) }
- [E21B 21/06](#) . Arrangements for treating drilling fluids outside the borehole (treating steps per se, see the relevant subclasses)
- [E21B 21/062](#) . . {by mixing components }
- [E21B 21/063](#) . . {by separating components }
- [E21B 21/065](#) . . . {Separating solids from drilling fluids }
- [E21B 21/066](#) . . . {with further treatment of the solids, e.g. for disposal }
- [E21B 21/067](#) . . . {Separating gases from drilling fluids }
- [E21B 21/068](#) . . {using chemical treatment }
- [E21B 21/07](#) . . for treating dust-laden gaseous fluids
- [E21B 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](#))
- [E21B 21/10](#) . Valve arrangements in drilling fluid circulation systems (valves in general [F16K](#))
- [E21B 21/103](#) . . {Down-hole by-pass valve arrangements, i.e. between the inside of the drill string and the annulus }
- [E21B 21/106](#) . . {Valve arrangements outside the borehole, e.g. kelly valves }
- [E21B 21/12](#) . using drilling pipes with plural fluid passages, e.g. closed circulation systems (pipes with plural fluid passages [E21B 17/18](#))
- [E21B 21/14](#) . using liquids and gases, e.g. foams
- [E21B 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](#))
- [E21B 21/18](#) . Preventing exhaust air from the drill motor from blowing-off towards the working face
- [E21B 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](#))**
- [E21B 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](#)) }
- [E21B 23/004](#) . { Indexing systems for guiding relative movement between telescoping parts of downhole tools }
- [E21B 23/006](#) . . { "J-slot" systems, i.e. lug and slot indexing mechanisms }
- [E21B 23/01](#) . for anchoring the tools or the like ([E21B 23/02](#) to [E21B 23/06](#) take precedence; anchoring of drives in the borehole [E21B 4/18](#); {packers [E21B 33/12](#) })

- E21B 23/02
 - for locking the tools or the like in landing nipples or in recesses between adjacent sections of tubing ([E21B 23/03](#) to [E21B 23/06](#) take precedence)
- E21B 23/03
 - for setting the tools into, or removing the tools from, laterally offset landing nipples or pockets
- E21B 23/04
 - operated by fluid means, e.g. actuated by explosion ([E21B 23/06](#), [E21B 23/08](#) take precedence)
- E21B 23/06
 - for setting packers
- E21B 23/065
 - [{setting tool actuated by explosion or gas generating means }](#)
- E21B 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](#))
- E21B 23/10
 - [Tools specially adapted therefor](#)
- E21B 23/14
 - for displacing a cable or cable-operated tool, e.g. for logging or perforating operations in deviated wells ([{side entry sub E21B 17/02D}](#); [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](#))
- E21B 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](#))
- E21B 25/005
 - [{Above ground means for handling the core, e.g. for extracting the core from the core barrel }](#)
- E21B 25/02
 - the core receiver being insertable into, or removable from, the borehole without withdrawing the drilling pipe ([retrievable drill bits E21B 10/64](#))
- E21B 25/04
 - [the core receiver having a core forming cutting edge or element, e.g. punch type core barrels](#)
- E21B 25/06
 - the core receiver having a flexible liner or inflatable retaining means
- E21B 25/08
 - Coating, freezing, consolidating cores ([E21B 25/06 takes precedence](#)) ; Recovering uncontaminated cores or cores at formation pressure
- E21B 25/10
 - Formed core retaining or severing means ([E21B 25/06](#), [E21B 25/08](#) take precedence)
- E21B 25/12
 - [of the sliding wedge type](#)
- E21B 25/14
 - [mounted on pivot transverse to core axis](#)
- E21B 25/16
 - for obtaining oriented cores
- E21B 25/18
 - the core receiver being specially adapted for operation under water
- E21B 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

- E21B 27/005 . {Collecting means with a strainer }
- E21B 27/02 . Dump bailers, i.e. containers for depositing substances, e.g. cement or acids
- E21B 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](#) }
- E21B 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](#))

WARNING

Group [E21B 28/00](#) is not complete. See also [E21B 43/003](#)
- E21B 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](#)) }**
- E21B 29/002 . {Cutting, e.g. milling, a pipe with a cutter rotating along the circumference of the pipe }
- E21B 29/005 . . {with a radially-expansible cutter rotating inside the pipe, e.g. for cutting an annular window }
- E21B 29/007 . . {with a radially-retracting cutter rotating outside the pipe }
- E21B 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](#))
- E21B 29/04 . Cutting of wire lines or the like ([E21B 29/02](#) takes precedence)
- E21B 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](#)) })
- E21B 29/08 . Cutting or deforming pipes to control fluid flow (shear type blow-out preventers [E21B 33/063](#))
- E21B 29/10 . Reconditioning of well casings, e.g. straightening
- E21B 29/12 . specially adapted for underwater installations ([E21B 29/08](#) takes precedence)
- E21B 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](#))**
- E21B 31/002 . {Destroying the objects to be fished, e.g. by explosive means (cutting by explosives [E21B 29/02](#)) }
- E21B 31/005 . {using vibrating or oscillating means (vibration generating arrangements for boreholes or wells [E21B 28/00](#)) }
- E21B 31/007 . {fishing tools with means for attaching comprising fusing or sticking }

- E21B 31/03 . Freeing by flushing; {Controlling differential pipe sticking }
- E21B 31/06 . using magnetic means
- E21B 31/107 . using impact means for releasing stuck parts, e.g. jars (telescoping joints [E21B 17/07](#))
- E21B 31/1075 . . {using explosives }
- E21B 31/113 . . hydraulically-operated
- E21B 31/1135 . . . {Jars with a hydraulic impedance mechanism, i.e. a restriction, for initially delaying escape of a restraining fluid }
- E21B 31/12 . Grappling tools, e.g. tongs or grabs
- E21B 31/125 . . {specially adapted for parted wire line or ropes }
- E21B 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](#))
- E21B 31/16 . . combined with cutting or destroying means (cutting or destroying means per se [E21B 29/00](#))
- E21B 31/18 . . gripping externally, e.g. overshot
- E21B 31/20 . . gripping internally, e.g. fishing spears
- E21B 33/00 Sealing or packing boreholes or wells**
- E21B 33/02 . Surface sealing or packing
- E21B 33/03 . . Well heads; Setting-up thereof (valve arrangements therefor [E21B 34/02](#))
- E21B 33/035 . . . specially adapted for underwater installations ([E21B 33/043](#), [E21B 33/064](#), [E21B 33/076](#) take precedence)
- E21B 33/0355 {Control systems, e.g. hydraulic, pneumatic, electric, acoustic, for submerged well heads }
- E21B 33/037 Protective housing therefor
- E21B 33/0375 {Corrosion protection means (in general [C23F](#)) }
- E21B 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](#))
- E21B 33/0385 {electrical connectors (underwater electrical connections in general [H01R 13/523](#)) }
- E21B 33/04 . . . Casing heads; Suspending casings or tubings in well heads (setting of casings in wells [E21B 43/10](#))
- E21B 33/0407 {with a suspended electrical cable }
- E21B 33/0415 {rotating or floating support for tubing or casing hanger }
- E21B 33/0422 {a suspended tubing or casing being gripped by a slip or an internally serrated member (slips in rotary table [E21B 19/10](#)) }
- E21B 33/043 specially adapted for underwater well heads ({[E21B 33/0407](#), } [E21B 33/047](#) take precedence)
- E21B 33/047 for plural tubing strings
- E21B 33/05 Cementing-heads, e.g. having provision for introducing cementing plugs
- E21B 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](#)) }

E21B 33/061	....	{Ram-type blow-out preventers, e.g. with pivoting rams }
E21B 33/062	.....	{with sliding rams }
E21B 33/063	.....	{for shearing drill pipes (cutting of wireline E21B 29/04 ; cutting pipes E21B 29/08) }
E21B 33/064	....	specialy adapted for underwater well heads (connectors therefor E21B 33/038 ; {control systems for submerged well-heads E21B 33/0355 })
E21B 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 })
E21B 33/072	....	for cable-operated tools (E21B 33/076 takes precedence)
E21B 33/076	....	specialy adapted for underwater installations
E21B 33/08	..	Wipers; Oil savers
E21B 33/085	...	{Rotatable packing means, e.g. rotating blow-out preventers }
E21B 33/10	.	in the borehole {sealing the junction between main bore and laterals E21B 41/0042 }
E21B 33/12	..	Packers; Plugs ({locking packers or plugs in landing nipples E21B 23/02 }; used for cementing E21B 33/134 , E21B 33/16)
E21B 33/1204	...	{permanent; drillable }
E21B 33/1208	...	{characterised by the construction of the sealing or packing means (E21B 33/1277 takes precedence) }
E21B 33/1212	....	{including a metal-to-metal seal element }
E21B 33/1216	....	{Anti-extrusion means, e.g. means to prevent cold flow of rubber packing }
E21B 33/122	...	Multiple string packers
E21B 33/124	...	Units with longitudinally-spaced plugs for isolating the intermediate space
E21B 33/1243	....	{with inflatable sleeves }
E21B 33/1246	.....	{inflated by down-hole pumping means operated by a pipe string }
E21B 33/126	...	with fluid-pressure-operated elastic cup or skirt (E21B 33/122 , E21B 33/124 take precedence)
E21B 33/1265	....	{with mechanical slips }
E21B 33/127	...	with inflatable sleeve (E21B 33/122 , E21B 33/124 take precedence)
E21B 33/1272	....	{inflated by down-hole pumping means operated by a pipe string }
E21B 33/1275	....	{inflated by down-hole pumping means operated by a down-hole drive }
E21B 33/1277	....	{characterised by the construction or fixation of the sleeve }
E21B 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 })
E21B 33/1285	....	{by fluid pressure }
E21B 33/129	...	with mechanical slips for hooking into the casing (E21B 33/122 , E21B 33/124 take precedence)
E21B 33/1291	....	{anchor set by wedge or cam in combination with frictional effect, using so-called drag-blocks (E21B 33/1295 takes precedence) }
E21B 33/1292	.....	{with means for anchoring against downward and upward movement }
E21B 33/1293	....	{with means for anchoring against downward and upward movement (E21B 33/1291 , E21B 33/1295 take precedence) }
E21B 33/1294	....	{characterised by a valve, e.g. a by-pass valve }
E21B 33/1295	....	actuated by fluid pressure
E21B 33/12955	.....	{using drag blocks frictionally engaging the inner wall of the well }

- E21B 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](#))
- E21B 33/134 . . . Bridging plugs { ([packers E21B 33/12](#)) }
- E21B 33/136 . . . Baskets, e.g. of umbrella type
- E21B 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 43/02B](#), [compositions therefor C09K 8/56](#)) }
- E21B 33/14 . . . for cementing casings into boreholes { ([using special cement compositions E21B 33/13B](#); [control of cementation quality or level E21B 47/0005](#)) }
- E21B 33/143 {[for underwater installations](#) }
- E21B 33/146 {[Stage cementing, i.e. discharging cement from casing at different levels](#) }
- E21B 33/16 using plugs for isolating cement charge; Plugs therefor { ([spacer compositions E21B 33/13B5](#); [stage cementing E21B 33/146](#)) }

- E21B 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](#))

- E21B 34/02 . in well heads
- E21B 34/04 . . in underwater well heads
- E21B 34/045 . . . {[adapted to be lowered on a tubular string into position within a blow-out preventer stack, e.g. so-called test trees](#) }

- E21B 34/06 . in wells
- E21B 34/063 . . {[Valve or closure with destructible element, e.g. frangible disc \(E21B 34/103 takes precedence\)](#) }
- E21B 34/066 . . {[electrically actuated](#) }
- E21B 34/08 . . responsive to flow or pressure of the fluid obtained ([E21B 34/10 takes precedence](#))
- E21B 34/085 . . . {[with time-delay systems, e.g. hydraulic impedance mechanisms](#) }
- E21B 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](#))
- E21B 34/101 . . . {[with means for equalizing fluid pressure above and below the valve](#) }
- E21B 34/102 . . . {[with means for locking the closing element in open or closed position \(E21B 34/105 and E21B 34/108 take precedence\)](#) }
- E21B 34/103 {[with a shear pin](#) }
- E21B 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](#) }
- E21B 34/106 {[the retrievable element being a secondary control fluid actuated valve landed into the bore of a first inoperative control fluid actuated valve](#) }
- E21B 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 \(E21B 34/106 takes precedence\)](#) }
- E21B 34/108 . . . {[with time delay systems, e.g. hydraulic impedance mechanisms](#) }
- E21B 34/12 . . operated by movement of casings or tubings
- E21B 34/125 . . . {[with time delay systems, e.g. hydraulic impedance mechanisms](#) }
- E21B 34/14 . . operated by movement of tools, e.g. sleeve valves operated by pistons or wire line

tools { ([E21B 34/066](#) takes precedence) }

- E21B 34/16 . Above-ground control means therefor { (control systems for submerged well heads [E21B 33/0355](#)) }

E21B 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](#))

E21B 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](#))

- E21B 36/001 . {Cooling arrangements }

- E21B 36/003 . {Insulating arrangements }

- E21B 36/005 . {Heater surrounding production tube }

- E21B 36/006 . {Combined heating and pumping means }

- E21B 36/008 . {using chemical heat generating means }

- E21B 36/02 . using burners

- E21B 36/025 . . {the burners being above ground or outside the bore hole }

- E21B 36/04 . using electrical heaters

E21B 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](#))

- E21B 37/02 . Scrapers specially adapted therefor

- E21B 37/04 . . operated by fluid pressure, e.g. free-piston scrapers (operating other tools by fluid pressure [E21B 23/08](#))

- E21B 37/045 . . . {Free-piston scrapers }

- E21B 37/06 . using chemical means for preventing, limiting { or eliminating } the deposition of paraffins or like substances (chemical compositions therefor [C09K 8/52](#))

- E21B 37/08 . cleaning in situ of down-hole filters, screens, {e.g. casing perforations, } or gravel packs ([E21B 37/06](#) takes precedence)

- E21B 37/10 . Well swabs { (pistons in general [F16J](#)) }

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

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

- E21B 41/0007 . {for underwater installations ([E21B 41/005](#), [E21B 41/04](#), [E21B 41/06](#), [E21B 41/08](#), [E21B 41/10](#) take precedence) }
- E21B 41/0014 . . {Underwater well locating or reentry systems }
- E21B 41/0021 . {Safety devices, e.g. for preventing small objects from falling into the borehole }
- E21B 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](#)) }
- E21B 41/0042 . . {characterised by sealing the junction between a lateral and a main bore }
- E21B 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](#)) }
- E21B 41/0057 . . {Disposal of a fluid by injection into a subterranean formation }
- E21B 41/0064 . . . { Carbon dioxide sequestration (storing fluids in porous layers [B65G 5/005](#)) }
- E21B 41/0071 . . {Adaptation of flares, e.g. arrangements of flares in offshore installations (flares of waste gases or noxious gases [F23G 7/08](#)) }
- E21B 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](#)) }
- E21B 41/0085 . {Adaptations of electric power generating means for use in boreholes (generation of electric power per se [H02](#)) }
- E21B 41/0092 . {Methods relating to program engineering, design or optimisation }
- E21B 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](#))
- E21B 41/04 . Manipulators for underwater operations, e.g. temporarily connected to well heads (manipulators in general [B25J](#))
- E21B 41/06 . Work chambers for underwater operations, e.g. temporarily connected to well heads (in general [B63C 11/00](#))
- E21B 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](#)

- E21B 41/10 . Guide posts, e.g. releasable; Attaching guide lines to underwater guide bases

Guidance heading: Obtaining fluids from wells

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](#))

- E21B 43/003 . {Vibrating earth formations (vibration generating arrangements for boreholes or wells [E21B 28/00](#)) }
- E21B 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](#)) }
- E21B 43/01 . specially adapted for obtaining from underwater installations (underwater well heads [E21B 33/035](#))
- E21B 43/0107 . . {Connecting of flow lines to offshore structures ([E21B 43/013](#) takes precedence) }
- E21B 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](#)) }
- E21B 43/013 . . connecting a production flow line to an underwater well head
- E21B 43/0135 . . . {using a pulling cable }
- E21B 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](#))
- E21B 43/02 . Subsoil filtering ([E21B 43/11](#)TAKES precedence, chemical compositions for consolidating loose sand or the like around wells [C09K 8/56](#))
- E21B 43/025 . . { Consolidation of loose sand or the like round the wells without excessively decreasing the permeability thereof (sealing borehole walls [E21B 33/138](#)) }
- E21B 43/04 . . Graveling of wells
- E21B 43/045 . . . { Crossover tools }
- E21B 43/08 . . Screens or liners { (expandable screens or liners [E21B 43/108](#); obtaining drinking water; filters [E03B 3/18](#)) }
- E21B 43/082 . . . {Screens comprising porous materials, e.g. prepacked screens }
- E21B 43/084 . . . {Screens comprising woven materials, e.g. mesh or cloth }
- E21B 43/086 . . . {Screens with preformed openings, e.g. slotted liners (comprising porous materials [E21B 43/082](#)) }
- E21B 43/088 . . . {Wire screens (comprising porous materials [E21B 43/082](#); comprising woven materials [E21B 43/084](#)) }
- E21B 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](#))
- E21B 43/101 . . . {for underwater installations }
- E21B 43/103 . . . { of expandable casings, screens, liners, or the like }
- E21B 43/105 {Expanding tools specially adapted therefor }
- E21B 43/106 { Couplings or joints therefor }
- E21B 43/108 { Expandable screens or liners }
- E21B 43/11 . Perforators; Permeators
- E21B 43/112 . . Perforators with extendable perforating members, e.g. actuated by fluid means
- E21B 43/114 . . Perforators using direct fluid action {on the wall to be perforated }, e.g. abrasive jets
- E21B 43/116 . . Gun or shaped charge perforators { (projectiles with shaped or hollow charge [F42B 12/10](#)) }
- E21B 43/117 . . . Shaped charge perforators ([E21B 43/118](#) takes precedence)

- E21B 43/118 . . . characterised by lowering in vertical position and subsequent tilting to operating position
- E21B 43/1185 . . . Ignition systems
- E21B 43/11852 {hydraulically actuated }
- E21B 43/11855 {mechanically actuated, e.g. by movement of a wireline or a drop-bar ([E21B 43/11852](#) takes precedence) }
- E21B 43/11857 {firing indication systems }
- E21B 43/119 . . Details, e.g. for locating perforating place or direction
- E21B 43/1195 . . . {Replacement of drilling mud; decrease of undesirable shock waves }

- E21B 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](#))
- E21B 43/121 . . {Lifting well fluids (survey of down-hole pump systems [E21B 47/0007](#)) }
- E21B 43/122 . . . {Gas lift }
- E21B 43/123 {Gas lift valves }
- E21B 43/124 . . . {Adaptation of jet-pump systems }
- E21B 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](#)) }
- E21B 43/127 {Adaptations of walking-beam pump systems }
- E21B 43/128 . . . {Adaptation of pump systems with down-hole electric drives }
- E21B 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](#)) }

- E21B 43/14 . Obtaining from a multiple-zone well

- E21B 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](#) })
- E21B 43/162 . . {Injecting fluid from longitudinally spaced locations in injection well }
- E21B 43/164 . . { Injecting CO2 or carbonated water (in combination with organic material [C09K 8/594](#)) }
- E21B 43/166 . . {Injecting a gaseous medium; Injecting a gaseous medium and a liquid medium (CO2 injection [E21B 43/164](#); steam injection [E21B 43/24](#)) }
- E21B 43/168 . . . {Injecting a gaseous medium }
- E21B 43/17 . . Interconnecting two or more wells by fracturing or otherwise attacking the formation ({[E21B 43/2405](#), } [E21B 43/247](#) take precedence)
- E21B 43/18 . . Repressuring or vacuum methods
- E21B 43/20 . . Displacing by water
- E21B 43/24 . . using heat, e.g. steam injection (heating, cooling or insulating wells [E21B 36/00](#)) { (in combination with organic material [E21B 43/22D](#)) }
- E21B 43/2401 . . . {by means of electricity }
- E21B 43/2403 . . . {by means of nuclear energy (nuclear reactors [G21](#)) }
- E21B 43/2405 . . . {in association with fracturing or crevice forming processes ([E21B 43/247](#) takes precedence) }
- E21B 43/2406 . . . { Steam assisted gravity drainage (SAGD) }
- E21B 43/2408 { SAGD in combination with other methods }

WARNING

Not complete pending a reorganisation. See also [E21B 43/24](#) and subgroups

- E21B 43/241 . . . combined with solution mining of non-hydrocarbon minerals, e.g. solvent pyrolysis of oil shale
- E21B 43/243 . . . Combustion in situ
- E21B 43/247 in association with fracturing processes {or crevice forming processes }
- E21B 43/248 using explosives

- E21B 43/25 . Methods for stimulating production (dump bailers [E21B 27/02](#); vibration generating arrangements [E21B 28/00](#); by vibrating earth formations [E21B 43/00C](#)] chemical compositions therefor [C09K 8/60](#))
- E21B 43/255 . . {including the injection of a gaseous medium as treatment fluid into the formation }
- E21B 43/26 . . by forming crevices or fractures { (chemical compositions therefor [C09K 8/62](#)) }
- E21B 43/261 . . . {Separate steps of (1) cementing, plugging or consolidating and (2) fracturing or attacking the formation }
- E21B 43/263 . . . using explosives { (Combustion in situ using explosives [E21B 43/248](#)) }
- E21B 43/2635 {by means of nuclear energy (peaceful applications of nuclear explosive devices in general [G21J 3/00](#)) }
- E21B 43/267 . . . reinforcing fractures by propping { (chemical compositions therefor [C09K 8/80](#)) }

- E21B 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](#) })
- E21B 43/281 . . {using heat (heating, cooling or insulating wells [E21B 36/00](#)) }
- E21B 43/283 . . {in association with a fracturing process }

- E21B 43/285 . Melting minerals, e.g. sulfur ([E21B 43/24](#) takes precedence; heating, cooling or insulating arrangements for wells [E21B 36/00](#))

- E21B 43/29 . Obtaining a slurry of minerals, e.g. by using nozzles
- E21B 43/292 . . {using steerable or laterally extendable nozzles }

- E21B 43/295 . Gasification of minerals, e.g. for producing mixtures of combustible gases ([E21B 43/243](#) takes precedence)

- E21B 43/30 . Specific pattern of wells, e.g. optimizing the spacing of wells (production satellite stations [E21B 43/017](#))
- E21B 43/305 . . {comprising at least one inclined or horizontal well }

- E21B 43/32 . Preventing gas- or water- coning phenoma, i.e. the formation of a conical column of gas or water around wells

- E21B 43/34 . Arrangements for separating materials produced by the well (separating apparatus per se, see the relevant subclasses)
- E21B 43/36 . . Underwater separating arrangements ([E21B 43/38](#) takes precedence)
- E21B 43/38 . . in the well

- E21B 43/385 . . . {by reinjecting the separated materials into an earth formation in the same well }
- E21B 43/40 . . Separation associated with re-injection of separated materials { ([E21B 43/385](#) takes precedence) }

Guidance heading: Automatic control, surveying or testing

E21B 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](#))

- E21B 44/005 . {Below-ground automatic control systems }
- E21B 44/02 . Automatic control of the tool feed ({[E21B 44/005](#) }, [E21B 44/10](#) take precedence)
- E21B 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](#)) }
- E21B 44/06 . . in response to the flow or pressure of the motive fluid of the drive
- E21B 44/08 . . in response to the amplitude of the movement of the percussion tool, e.g. jump or recoil
- E21B 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](#) }

E21B 45/00 **Measuring the drilling time or rate of penetration**

E21B 47/00 **Survey of boreholes or wells** (monitoring pressure or flow of drilling fluid [E21B 21/08](#); geophysical logging [G01V](#))

- E21B 47/0001 . {for underwater installations }
- E21B 47/0002 . { Survey of boreholes or wells by visual inspection (photographing internal surfaces, e.g. of pipes [G03B 37/005](#), [E21B57/A7B8](#); closed circuit television systems [H04N 7/18](#)) }
- E21B 47/0003 . {Determining well or borehole volumes (determining depth [E21B 47/04](#), diameter [E21B 47/08](#); measuring volumes in general [G01F](#)) }
- E21B 47/0005 . {control of cementation quality or level (measuring temperature [E21B 47/065](#)) }
- E21B 47/0006 . {Measuring stresses in a well bore pipe string or casing (for locating stuck pipe [E21B 47/09](#)) }
- E21B 47/0007 . {Survey of down-hole pump systems }
- E21B 47/0008 . . {Survey of walking-beam pump systems, e.g. for the detection of so called "pumped-off" conditions }

- E21B 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](#)

- E21B 47/011 . . {Protecting measuring instruments (cooling or insulating arrangements for boreholes or wells [E21B 36/00](#)) }
- E21B 47/02 . Determining slope or direction ([clinometers or direction meters G01C](#))
- E21B 47/022 . . of the borehole, {e.g. using geomagnetism }
- E21B 47/02208 . . . {using seismic or acoustic means }
- E21B 47/02216 . . . {using at least one source of electromagnetic energy and at least one detector therefor }
- E21B 47/02224 {at least one of the sources or one of the detectors being located above ground }
- E21B 47/02232 . . . {using a pendulum }
- E21B 47/024 . . of devices in the borehole ([E21B 47/022](#) takes precedence)
- E21B 47/026 . . of penetrated ground layers (apparatus for obtaining oriented cores [E21B 25/16](#); formation testing [E21B 49/00](#))
- E21B 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](#) }
- E21B 47/042 . . {Measuring or locating liquid level ([E21B 47/044](#) takes precedence) }
- E21B 47/044 . . {using radioactive markers }
- E21B 47/06 . Measuring temperature or pressure ([measuring temperature in general G01K](#) ; [measuring pressure in general G01L](#)) {[telerecorders for pressure G01L](#) ; [telerecorders for temperature G01K](#) }
- E21B 47/065 . . {Measuring temperature }
- E21B 47/08 . Measuring the diameter ([measuring diameter in general G01B](#))
- E21B 47/082 . . {using radiant means, e.g. acoustic, radioactive, electromagnetic }
- E21B 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](#))
- E21B 47/0905 . . {by detecting magnetic anomalies ([investigating materials by investigating magnetic variables G01N 27/72](#)) }
- E21B 47/091 . . {by detecting an acoustic anomaly, e.g. a mud-pressure pulse }
- E21B 47/0915 . . {using impression packers, e.g. to detect recesses or perforations }
- E21B 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](#) }
- E21B 47/1005 . . {using thermal measurements ([measurement temperature E21B 47/065](#)) }

- E21B 47/101 . . {using acoustic energy }
- E21B 47/1015 . . {using tracers: using radioactivity }
- E21B 47/102 . . {using electrical indications: using light radiations }
- E21B 47/1025 . . {Detecting leaks, e.g. of tubing, by pressure testing (investigating fluid-tightness of structures by using fluid or vacuum [G01M 3/02](#)) }

- E21B 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](#))
- E21B 47/121 . . {using earth as an electrical conductor ([E21B 47/122](#) takes precedence; in general [H04B 13/02](#) ; electric prospecting [G01V 3/00](#)) }
- E21B 47/122 . . {by electromagnetic energy, e.g. radio frequency (in general [H04B](#) magnetic prospecting [G01V 3/00](#)) }
- E21B 47/123 . . . {using light waves (optical transmission in general [H04B 10/00](#); light guides, e.g. optical fibres [G02B 6/00](#)) }
- E21B 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](#)) }
- E21B 47/14 . . using acoustic waves
- E21B 47/16 . . . through the drill string or casing, {e.g. by torsional acoustic waves }
- E21B 47/18 . . . through the well fluid, {e.g. mud pressure pulse telemetry }
- E21B 47/182 {by continuous mud waves with modulation of the waves }
- E21B 47/185 {by negative mud pulses using a pressure relieve valve between drill pipe and annulus }
- E21B 47/187 {by positive mud pulses using a flow restricting valve within the drill pipe }

- E21B 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](#))**

- E21B 49/001 . {specially adapted for underwater installations }
- E21B 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](#)) }
- E21B 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](#)) }
- E21B 49/006 . {Measuring wall stresses in the borehole (investigation of mechanical properties of foundation soil [E02D 1/022](#)) }
- E21B 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](#)) }
- E21B 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](#))
- E21B 49/025 . . {of underwater soil, e.g. with grab devices (underwater coring [E21B 25/18](#)) }
- E21B 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](#) }

- E21B 49/06 .. with side-wall drilling tools {[pressing](#) } or scrapers
- E21B 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](#)) }
- E21B 49/081 .. {with [down-hole means for trapping a fluid sample \(E21B 49/10 takes precedence\)](#) }
- E21B 49/082 ... {[Wire-line fluid samplers \(E21B 49/083 takes precedence\)](#) }
- E21B 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](#) }
- E21B 49/084 .. { [with means for conveying samples through pipe to surface](#) }
- E21B 49/086 .. { [Withdrawing samples at the surface](#) }
- E21B 49/087 .. { [Well testing, e.g. testing for reservoir productivity or formation parameters](#) }
- E21B 49/088 ... { [combined with sampling](#) }
- E21B 49/10 .. using side-wall fluid samplers or testers

- E21B 2003/00** **Rotary drilling** ([drives used in the borehole E21B 4/00](#); [rotary drilling machines in general B23B](#))

- E21B 2003/02 . Surface drives for rotary drilling
- E21B 2003/05 .. with a to-and-fro rotation of the drill pipe or casing

- E21B 2010/00** **Drill bits** ([specially adapted for deflecting the direction of boring E21B 7/064](#); [with means for collecting substances E21B 27/00](#))

- E21B 2010/08 . Roller bits ([roller core bits E21B 10/06](#); [with leading portion E21B 10/26](#); [characterised by wear resisting parts E21B 10/46](#))
- E21B 2010/22 .. characterised by bearing, lubrication or sealing details
- E21B 2010/225 ... sealing details
- E21B 2010/24 ... characterised by lubricating details
- E21B 2010/243 with drilling fluid supply to the bearing

- E21B 2010/42 . 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](#))
- E21B 2010/425 .. characterised by teeth or cutter arrangement

- E21B 2010/46 . characterised by wear resisting parts, e.g. diamond inserts { ([drill bits with self-renewable cutting edge E21B 10/006](#)) }
- E21B 2010/54 .. the bit being of the rotary drag type, e.g. fork-type bits
- E21B 2010/545 ... with blades having performed cutting elements mounted on a distinct support, e.g. polycrystalline inserts
- E21B 2010/56 .. Button type inserts ([E21B 10/52 takes precedence](#))
- E21B 2010/561 ... Inserts with performed cutting elements mounted on a distinct support, e.g. polycrystalline inserts
- E21B 2010/562 having a non planar or non circular cutting face
- E21B 2010/563 having a cutting face with different segments, e.g. mosaic-type inserts

E21B 2010/564	....	characterised by support details
E21B 2010/565	.....	Interface between the substrate and the cutting element
E21B 2010/566	....	with chip breaking arrangements
E21B 2010/60	.	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 })
E21B 2010/607	..	characterised by the nozzle structure
E21B 2010/62	.	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)
E21B 2010/622	..	with plural separable cutter elements
E21B 2010/624	...	independently attachable
E21B 2021/00		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)
E21B 2021/005	.	using gaseous fluids
E21B 2021/006	.	Underbalanced techniques, i.e. where borehole fluid pressure is below formation pressure
E21B 2021/007	.	Arrangements for handling drilling fluids or cuttings outside the borehole, e.g. mud boxes
E21B 2021/008	..	Means engaging the bore entrance, e.g. hoods for collecting dust
E21B 2021/06	.	Arrangements for treating drilling fluids outside the borehole (treating steps per se, see the relevant subclasses)
E21B 2021/061	..	for treating dust-loaded gaseous fluids
E21B 2023/00		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)
E21B 2023/008	.	Self propelling system or apparatus, e.g. for moving tools within the horizontal portion of a borehole
E21B 2033/00		Sealing or packing boreholes or wells
E21B 2033/005	.	Sealings characterised by their shape
E21B 2033/10	.	in the borehole { sealing the junction between main bore and laterals E21B 41/0042 }
E21B 2033/105	..	characterised by sealing the junction between a lateral and a main bore
E21B 2034/00		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)
E21B 2034/002	.	Ball valves

- [E21B 2034/005](#) . Flapper valves
- [E21B 2034/007](#) . Sleeve valves
- E21B 2041/00** **Equipment or details not covered by groups [E21B 15/00](#) to [E21B 40/00](#)**
- [E21B 2041/0028](#) . Fuzzy logic, artificial intelligence, neural networks, or the like
- E21B 2043/00** **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](#))**
- [E21B 2043/01](#) . specially adapted for obtaining from underwater installations ([underwater well heads \[E21B 33/035\]\(#\)](#))
- [E21B 2043/0115](#) . . Drilling for or production of natural gas hydrate reservoirs; Drilling through or monitoring of formations containing gas hydrates
- [E21B 2043/12](#) . 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](#))
- [E21B 2043/121](#) . . {[Lifting well fluids \(survey of down-hole pump systems \[E21B 47/0007\]\(#\)\)](#) }
- [E21B 2043/125](#) . . . Adaptation of walking-beam pump systems
- E21B 2049/00** **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](#))**
- [E21B 2049/08](#) . 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](#)) }
- [E21B 2049/085](#) . . Determining specific physical fluid parameters