

CPC COOPERATIVE PATENT CLASSIFICATION

E FIXED CONSTRUCTIONS

EARTH DRILLING; MINING

E21 EARTH DRILLING; MINING

E21C MINING OR QUARRYING

NOTES

1. This subclass covers methods or apparatus specific to mining or quarrying
2. This subclass does not cover, even though they may be disclosed only for mining or quarrying, drill bits, bore reamers, core taking devices, drilling pipes or rods, handling, racking or connecting arrangements for drilling pipes or rods, counterboring or enlarging drilled holes, flame drilling, or other drilling apparatus, which are covered by subclass [E21B](#)

WARNING

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.

Cutting, Slitting, Dislodging

- | | | | |
|--------------|---|--------------|--|
| 25/00 | Cutting machines, i.e. for making slits approximately parallel or perpendicular to the seam (dislodging machines with slitting means E21C 27/02, E21C 27/10, E21C 27/18) | 25/52 | • Machines incorporating two or more of the slitting means according to groups E21C 25/02 , E21C 25/06 , E21C 25/16 , E21C 25/20 and E21C 25/22 |
| 25/02 | • Machines slitting solely by one or more percussive tools moved through the seam | 25/54 | • Slitting by unguided cutter cables or cutter chains, or by unguided tools drawn along the working face by cables or the like (dislodging by planing means E21C 27/32 ; propulsion by haulage cables E21C 29/14) |
| 25/04 | • . Cutting crowns or other tools (percussion drill bits E21B 10/36) | 25/56 | • Slitting by cutter cables or cutter chains or by tools drawn along the working face by cables or the like, in each case guided parallel to the face, e.g. by a conveyor or by a guide parallel to a conveyor (pressing the conveyor equipped with tools toward the working face E21C 35/14) |
| 25/06 | • Machines slitting solely by one or more cutting rods or cutting drums which rotate, move through the seam, and may or may not reciprocate | 25/58 | • Machines slitting by drilling hole on hole |
| 25/08 | • . Mountings for the rods or drums | 25/60 | • Slitting by jets of water or other liquid (picks with arrangement of fluid-spraying nozzles E21C 35/187 ; distribution of spraying fluids in rotating cutter-heads E21C 35/23) |
| 25/10 | • . Rods; Drums | 25/62 | • Machines for making slits approximately perpendicular to the seams either level with, or above or below the level of, the machine |
| 25/14 | • . with equipment for cleaning the slit (associated with cutter chain machines E21C 25/50) | 25/64 | • Slitting machines guided solely by hand and either carried by hand or mounted on supports (hand-held power-operated tools E21C 37/22) |
| 25/145 | • . . {COWLS} | 25/66 | • Machines for making slits with additional arrangements for drilling |
| 25/16 | • Machines slitting solely by one or more rotating saws, cutting discs, or wheels | 25/68 | • Machines for making slits combined with equipment for removing, e.g. by loading, material won by other means (slitting machines combined with planing means E21C 27/18 ; removing chippings E21C 35/20) |
| 25/18 | • . Saws; Discs; Wheels | 27/00 | Machines which completely free the mineral from the seam |
| 25/20 | • Machines slitting solely by one or more reciprocating sawing implements or reciprocating cutter chains; Shaker conveyors with cutting means | 27/01 | • specially adapted for removing overhanging coal |
| 25/22 | • Machines slitting solely by one or more cutter chains moving unidirectionally along jibs | 27/02 | • solely by slitting (rods, drums, for same E21C 25/10 ; saws, discs, wheels E21C 25/18 ; chains, chain guides, for same E21C 25/28) |
| 25/24 | • . with flat jibs only | 27/04 | • . by a single chain guided on a frame with or without auxiliary slitting means |
| 25/26 | • . with curved jibs only | | |
| 25/28 | • . Chains or chain guides | | |
| 25/30 | • . . Chain guides | | |
| 25/32 | • . . . specially adapted for curved jibs | | |
| 25/34 | • . . Chains | | |
| 25/36 | • . . . Couplings for links | | |
| 25/365 | • {allowing the bending into at least two planes (chains for conveyors which are allowed to bend into at least two planes B65G 17/385)} | | |
| 25/40 | • . . . having links with integrally formed picks | | |
| 25/50 | • . with equipment for cleaning the slit (associated with rotary-rod or rotary-drum machines E21C 25/14) | | |

- 27/06 . . . with a slewing frame
- 27/08 . . with additional means for cutting the mineral into blocks
- 27/10 . by both slitting and breaking-down
- 27/12 . . breaking-down effected by acting on the vertical face of the mineral, e.g. by percussive tools
- 27/122 . . . {with breaking-down members having a striking action}
- 27/124 . . . {with rotatable cutters provided with breaking-down members}
- 27/126 . . . {with slitting and breaking-down members situated in parallel on an intermediary level}
- 27/128 . . . {with breaking-down members functioning on the slitting level}
- 27/14 . . breaking-down effected by force or pressure applied to side of slit, e.g. by wedges (breaking-down by means inserted in boreholes [E21C 37/00](#))
- 27/16 . . . with means for both slitting and breaking-down
- 27/18 . by both slitting and planing
- 27/20 . Mineral freed by means not involving slitting
- 27/22 . . by rotary drills with breaking-down means, e.g. wedge-shaped drills {, i.e. the rotary axis of the tool carrier being substantially perpendicular to the working face, e.g. MARIETTA-type (similar machines for tunneling [E21D 9/102](#))}
- 27/24 . . by milling means acting on the full working face {, i.e. the rotary axis of the tool carrier being substantially parallel to the working face (similar machines for tunneling [E21D 9/1026](#))}
- 27/26 . . by closely adjacent cutter chains acting on the full working face
- 27/28 . . by percussive drills with breaking-down means, e.g. wedge-shaped tools
- 27/30 . . by jaws, buckets or scoops that scoop-out the mineral
- 27/32 . . by adjustable or non-adjustable planing means with or without loading arrangements (by percussed planing means [E21C 27/46](#))
- 27/34 . . . Machine propelled along the working face by cable or chain
- 27/35 Ram-ploughs
- 27/36 . . . Machine self-propelled along the working face
- 27/38 . . . Machine stationary while planing in an arc
- 27/40 . . . Machine and its planing tool making alternative step-wise movements along the working face
- 27/42 . . . combined with scraper or collector box
- 27/44 . . . Planing knives (mining picks [E21C 35/18](#))
- 27/46 . . by percussed planing means
- 29/00 Propulsion of machines for slitting or completely freeing the mineral from the seam**
- 29/02 . by means on the machine exerting a thrust against fixed supports
- 29/04 . by cable or chains
- 29/06 . . anchored at one or both ends to the mine working face {(propulsion using fixed racks along which the machine is running [E21C 29/02](#))}
- 29/08 . . . Anchoring arrangements (for anchoring of conveyors only [E21F 13/00](#))
- 29/10 . . . Cable or chain co-operating with a winch or the like on the machine
- 29/12 . . . Machines propelled by thrust or pull against a part alternately anchored to and released from a cable or chain
- 29/14 . . by haulage cable or chain pulling the machine along the working face
- 29/145 . . . {Means for tensioning the haulage chains or cables}
- 29/16 . . . Winches or other means for pulling cable or chain (winches in general [B66D](#))
- 29/18 . . . Coupling and uncoupling machine to cable or chain
- 29/185 {with coupling or uncoupling of the machine at will}
- 29/20 . . with safety devices operating in the event of breakage of the cable or chain
- 29/22 . by wheels, endless tracks or the like {(propulsion using fixed racks along which the machine is running [E21C 29/02](#))}
- 29/24 . . Trucks carrying the machine while working
- 29/26 . . . with means for adjustably positioning the machine on the truck
- 29/28 adjusting the height of the whole machine
- 31/00 Driving means incorporated in machines for slitting or completely freeing the mineral from the seam**
- 31/02 . for cutting or breaking-down devices
- 31/025 . . {by another slitting or extracting member}
- 31/04 . . imparting both a rotary and reciprocating motion
- 31/06 . . actuated by an endless cable or chain
- 31/08 . for adjusting parts of the machines
- 31/10 . for slewing parts of the machines
- 31/12 . Component parts
- 33/00 Trucks or other devices for transporting machines for slitting or completely freeing the mineral from the seam**
- 33/02 . with equipment for loading or unloading the machine on to or from the truck
- 33/025 . . {the unloaded machine remaining connected to the transport vehicle}
- 35/00 Details of, or accessories for, machines for slitting or completely freeing the mineral from the seam, not provided for in groups [E21C 25/00](#) - [E21C 33/00](#), [E21C 37/00](#) or [E21C 39/00](#)**
- 35/02 . Locking equipment for slewable parts
- 35/04 . Safety devices (operating in the event of breakage of a haulage cable or chain [E21C 29/20](#))
- 35/043 . . {Protection against overload during transfer of machines for slitting or completely freeing the mineral from the seam}
- 35/046 . . {Protection of cables or pipes for supplying power}
- 35/06 . Equipment for positioning the whole machine in relation to its sub-structure

- 35/08 . Guiding the machine
WARNING
Group [E21C 35/08](#) is impacted by reclassification into groups [E21C 35/302](#) and [E21C 35/282](#).
All groups listed in this Warning should be considered in order to perform a complete search.
- 35/10 . . by feelers contacting the working face
WARNING
Group [E21C 35/10](#) is impacted by reclassification into groups [E21C 35/282](#) and [E21C 35/302](#).
All groups listed in this Warning should be considered in order to perform a complete search.
- 35/12 . . along a conveyor for the cut material
WARNING
Group [E21C 35/12](#) is impacted by reclassification into groups [E21C 35/282](#) and [E21C 35/302](#).
All groups listed in this Warning should be considered in order to perform a complete search.
- 35/125 . . . {Means for inclining the conveyor}
WARNING
Group [E21C 35/125](#) is impacted by reclassification into groups [E21C 35/282](#) and [E21C 35/302](#).
All groups listed in this Warning should be considered in order to perform a complete search.
- 35/14 . . . Equipment for pressing the conveyor towards the working face
WARNING
Group [E21C 35/14](#) is impacted by reclassification into groups [E21C 35/282](#) and [E21C 35/302](#).
All groups listed in this Warning should be considered in order to perform a complete search.
- 35/16 . . by making use of the timbering, filling, or other supports
WARNING
Group [E21C 35/16](#) is impacted by reclassification into groups [E21C 35/282](#) and [E21C 35/302](#).
All groups listed in this Warning should be considered in order to perform a complete search.
- 35/18 . Mining picks; Holders therefor ([planing knives E21C 27/44](#))
- 35/183 . . with inserts or layers of wear-resisting material
{([drill bits with wear-resistant parts E21B 10/46](#))}
- 35/1831 . . . {Fixing methods or devices}
- 35/1833 . . . {Multiple inserts}
- 35/1835 . . . {Chemical composition or specific material}
- 35/1837 . . . {characterised by the shape}
- 35/184 . . {Reversible picks, i.e. having two working ends, one operating, the other in reserve}
- 35/186 . . {using a locking piston actuated hydraulically, e.g. by spraying-fluid pressure}
- 35/187 . . with arrangement of fluid-spraying nozzles
(supply of fluid to the nozzles [E21C 35/22](#))
- 35/188 . . {characterised by adaptations to use an extraction tool}
- 35/19 . . Means for fixing picks or holders
- 35/191 . . . {for fixing holders}
- 35/193 . . . using bolts as main fixing elements
- 35/1933 {the picks having a cylindrical shank}
- 35/1936 {the picks having a square- or rectangular-section shank}
- 35/197 . . . using sleeves, rings or the like, as main fixing elements
- 35/20 . General features of equipment for removal of chippings, e.g. for loading on conveyor
- 35/22 . Equipment for preventing the formation of, or for removal of, dust ([picks with arrangement of fluid-spraying nozzles E21C 35/187](#); [removing dust while drilling E21B 21/011](#))
- 35/223 . . {Equipment associated with mining machines for sucking dust-laden air from the cutting area, with or without cleaning of the air}
- 35/226 . . {Control valves for the spraying liquid used in dust suppression systems}
- 35/23 . . Distribution of spraying-fluids in rotating cutter-heads
- 35/24 . Remote control specially adapted for machines for slitting or completely freeing the mineral ([control in general G05](#))
WARNING
Group [E21C 35/24](#) is impacted by reclassification into groups [E21C 35/282](#) and [E21C 35/302](#).
All groups listed in this Warning should be considered in order to perform a complete search.
- 35/282 . {Autonomous machines; Autonomous operations}
WARNING
Group [E21C 35/282](#) is incomplete pending reclassification of documents from groups [E21C 35/08](#), [E21C 35/10](#), [E21C 35/12](#), [E21C 35/125](#), [E21C 35/14](#), [E21C 35/16](#) and [E21C 35/24](#).
All groups listed in this Warning should be considered in order to perform a complete search.

- 35/302 . {[Measuring, signaling or indicating specially adapted for machines for slitting or completely freeing the mineral \(measuring or indicating on tunneling machines E21D 9/003\)](#)}

WARNING

Group [E21C 35/302](#) is incomplete pending reclassification of documents from groups [E21C 35/08](#), [E21C 35/10](#), [E21C 35/12](#), [E21C 35/125](#), [E21C 35/14](#), [E21C 35/16](#) and [E21C 35/24](#).

All groups listed in this Warning should be considered in order to perform a complete search.

37/00 Other methods or devices for dislodging with or without loading (breaking-down by means inserted in slits [E21C 27/14](#))

- 37/005 . {[by projectiles](#)}
- 37/02 . by wedges
- 37/04 . by devices with parts pressed mechanically against the wall of a borehole {[or a slit](#)}
- 37/06 . by making use of hydraulic or pneumatic pressure in a borehole
- 37/08 . . Devices with pistons, plungers, or the like, pressed locally against the wall of the borehole {[\(E21C 37/10 takes precedence\)](#)}
- 37/10 . . Devices with expanding elastic casings
- 37/12 . . by injecting into the borehole a liquid, either initially at high pressure or subsequently subjected to high pressure, e.g. by pulses, by explosive cartridges acting on the liquid ([slitting by jets of water E21C 25/60; blasting by explosives F42D](#))
- 37/14 . . by compressed air; by gas blast; by gasifying liquids
- 37/16 . by fire-setting or by similar methods based on a heat effect ([drilling by use of heat E21B 7/14](#))
- 37/18 . by electricity
- 37/20 . by ultrasonics
- 37/22 . Hand tools or hand-held power-operated tools specially adapted for dislodging minerals ([slitting machines guided solely by hand E21C 25/64](#))
- 37/24 . . Pick hammers ([pneumatic hammers in general B25D; percussion drilling E21B 1/00](#))
- 37/26 . Chisels or other cutting tools not mentioned before

39/00 Devices for testing *in situ* the hardness or other properties of minerals, e.g. for giving information as to the selection of suitable mining tools

Methods of mining or quarrying; Open-pit mining; Layouts therefor

- 41/00 Methods of underground or surface mining ([E21C 45/00 takes precedence](#)); Layouts therefor (for peat [E21C 49/00](#))**
- 41/16 . Methods of underground mining ([winning machines therefor E21C 25/00 - E21C 39/00](#)); Layouts therefor
- 41/18 . . for brown or hard coal
- 41/20 . . for rock salt or potash salt
- 41/22 . . for ores, e.g. mining placers
- 41/24 . . for oil-bearing deposits

- 41/26 . Methods of surface mining ([machines for obtaining, or the removal of, materials in open-pit mines E21C 47/00](#)); Layouts therefor
- 41/28 . . for brown or hard coal
- 41/30 . . for ores, e.g. mining placers
- 41/31 . . {[for oil-bearing deposits](#)}
- 41/32 . Reclamation of surface-mined areas ([machines or methods for treating or working soil for agricultural purposes A01B 77/00, A01B 79/00; machines for back-filling E02F 5/22](#))

45/00 Methods of hydraulic mining; Hydraulic monitors ([E21C 25/60 takes precedence](#))

- 45/02 . Means for generating pulsating fluid jets
- 45/04 . . by use of highly pressurised liquid
- 45/06 . . by use of compressed gases
- 45/08 . Automatic or remote control of hydraulic monitors

47/00 Machines for obtaining or the removal of materials in open-pit mines ([obtaining peat E21C 49/00](#))

- 47/02 . for coal, brown coal, or the like ([dredgers or soil-shifting machines in general E02F](#))
- 47/04 . . Conveyor bridges used in co-operation with the winning apparatus
- 47/06 . . Cableway conveyors used in co-operation with the winning apparatus ([underground hauling E21F 13/00](#))
- 47/08 . . Devices for cutting-out partings, e.g. layers of sand between seams of coal
- 47/10 . for quarrying stone, sand, gravel, or clay

49/00 Obtaining peat; Machines therefor ([treating peat C10F](#))

- 49/02 . by excavating
- 49/04 . by digging in the form of peat sods

50/00 Obtaining minerals from underwater, not otherwise provided for ([suction dredgers or component parts thereof E02F 3/88; equipment for conveying or separating excavated material E02F 7/00; dippers G01N 1/12](#))

- 50/02 . dependent on the ship movements ([vessels or floating structures adapted for special purposes B63B 35/00](#))

51/00 Apparatus for, or methods of, winning materials from extraterrestrial sources ([cosmonautics B64G](#))

2100/00 Modeling, simulating or designing mining operations

2200/00 Mining robots