

E21 EARTH OR ROCK DRILLING; MINING**E21C MINING OR QUARRYING****CUTTING; SLITTING; DISLODGING**

General structure of machines	25/00, 27/00
Details	29/00, 31/00, 35/00
Other devices	33/00, 37/00, 39/00

METHODS OF MINING OR QUARRYING;

OPEN-PIT MINING	41/00, 45/00; 47/00, 49/00
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OBTAINING MINERALS FROM

UNDERWATER	50/00
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WINNING MATERIALS FROM

EXTRATERRESTRIAL SOURCES	51/00
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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)
25/02	. Machines slitting solely by one or more percussive tools moved through the seam
25/04	. . Cutting crowns or other tools (percussion drill bits E21B 10/36)
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
25/08	. . Mountings for the rods or drums
25/10	. . Rods; Drums [6]
25/14	. . with equipment for cleaning the slit (associated with cutter chain machines E21C 25/50)
25/16	. Machines slitting solely by one or more rotating saws, cutting discs, or wheels
25/18	. . Saws; Discs; Wheels
25/20	. Machines slitting solely by one or more reciprocating sawing implements or reciprocating cutter chains; Shaker conveyers with cutting means
25/22	. Machines slitting solely by one or more cutter chains moving unidirectionally along jibs
25/24	. . with flat jibs only
25/26	. . with curved jibs only
25/28	. . Chains or chain guides [6]
25/30	. . . Chain guides
25/32	. . . specially adapted for curved jibs
25/34	. . . Chains
25/36	. . . Couplings for links
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)
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
25/54	. 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)
25/56	. 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 conveyer, by a guide parallel to a conveyer (pressing the conveyer equipped with tools toward the working face E21C 35/14)
25/58	. Machines slitting by drilling hole on hole

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) [6]
25/62	. Machines for making slits approximately perpendicular to the seams either level with, or above or below the level of, the machine
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)
25/66	. Machines for making slits with additional arrangements for drilling
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)
27/00	Machines which completely free the mineral from the seam
27/01	. specially adapted for removing overhanging coal
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)
27/04	. . by a single chain guided on a frame with or without auxiliary slitting means
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
27/14	. . 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
27/24	. . by milling means acting on the full working face
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

E21C

- 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
- 29/08 Anchoring arrangements (for anchoring of conveyers 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
- 29/16 Winches or other means for pulling cable or chain (winches in general B66D)
- 29/18 Coupling and uncoupling machine to cable or chain
- 29/20 . . . with safety devices operating in the event of breakage of the cable or chain
- 29/22 . . by wheels, endless tracks, or the like
- 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
- 31/04 . . . 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

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)
- 35/06 . . Equipment for positioning the whole machine in relation to its sub-structure
- 35/08 . . Guiding the machine
- 35/10 . . . by feelers contacting the working face
- 35/12 . . . along a conveyer for the cut material
- 35/14 Equipment for pressing the conveyer towards the working face

- 35/16 . . . by making use of the timbering, filling, or other supports
- 35/18 . . Mining picks; Holders therefor (planing knives E21C 27/44) [6]
- 35/183 . . . with inserts or layers of wear-resisting material [6]
- 35/187 . . . with arrangement of fluid-spraying nozzles (supply of fluid to the nozzles E21C 35/22) [6]
- 35/19 . . Means for fixing picks or holders [6]
- 35/193 using bolts as main fixing elements [6]
- 35/197 using sleeves, rings or the like, as main fixing elements [6]
- 35/20 . . General features of equipment for removal of chippings, e.g. for loading on conveyer
- 35/22 . . Equipment for preventing the formation of, or for removal of, dust (picks with arrangement of fluid-spraying nozzles E21C 35/187; methods or apparatus for flushing boreholes E21B 21/00)
- 35/23 . . . Distribution of spraying-fluids in rotating cutter-heads [6]
- 35/24 . . Remote control specially adapted for machines for slitting or completely freeing the mineral (control in general G05)

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

- 37/02 . . by wedges
- 37/04 . . by devices with parts pressed mechanically against the wall of a borehole
- 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
- 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 (methods or apparatus for obtaining oil, gas, water, soluble or meltable materials or a slurry of minerals from wells E21B 43/00)

41/00 **Methods of underground or surface mining**

(E21C 45/00 takes precedence); **Layouts therefor** (for peat E21C 49/00) [5]

- 41/16 . . Methods of underground mining (winning machines therefor E21C 25/00 E21C 39/00); Layouts therefor [5]

- 41/18 . . . for brown or hard coal [5]

- 41/20 . . for rock salt or potash salt [5]
- 41/22 . . for ores, e.g. mining placers [5]
- 41/24 . . for oil-bearing deposits [5]
- 41/26 . Methods of surface mining (machines for obtaining, or the removal of, materials in open-pit mines E21C 47/00); Layouts therefor [5]
- 41/28 . . for brown or hard coal [5]
- 41/30 . . for ores, e.g. mining placers [5]
- 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) [5]

- 45/00 Methods of hydraulic mining; Hydraulic monitors** (E21C 25/60 takes precedence) [5]
- 45/02 . Means for generating pulsating fluid jets [5]
- 45/04 . . by use of highly pressurised liquid [5]
- 45/06 . . by use of compressed gases [5]
- 45/08 . Automatic or remote control of hydraulic monitors [5]

- 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) [3]

- 47/04 . . Conveyer bridges used in co-operation with the winning apparatus [3]
- 47/06 . . Cableway conveyers 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) [5]
- 50/02 . dependent on the ship movements (vessels or floating structures adapted for special purposes B63B 35/00) [5]

- 51/00 Apparatus for, or methods of, winning materials from extraterrestrial sources** (cosmonautics B64G) [2]