

## ECLA EUROPEAN CLASSIFICATION

### E21D

#### SHAFTS; TUNNELS; GALLERIES; LARGE UNDERGROUND

**CHAMBERS** (soil-conditioning or soil-stabilising materials [C09K17/00](#); drilling or cutting machines for mining or quarrying [E21C](#); safety devices, transport, rescue, ventilation or drainage [E21F](#))

[N: **WARNING**  
[C0310]

- The following IPC groups are not used in the internal ECLA classification scheme. Subject matter covered by these groups is classified in the following ECLA groups:

<a href="#">E21D9/01</a>	covered by	<a href="#">E21D9/00</a>
<a href="#">E21D9/087</a>	covered by	<a href="#">E21D9/00</a>
<a href="#">E21D9/093</a>	covered by	<a href="#">E21D9/00</a>
<a href="#">E21D13/02</a>	covered by	<a href="#">E21D13/00</a>
<a href="#">E21D13/04</a>	covered by	<a href="#">E21D13/00</a>
<a href="#">E21D15/582</a>	covered by	<a href="#">E21D15/58</a>
<a href="#">E21D15/59</a>	covered by	<a href="#">E21D15/44</a> , <a href="#">E21D15/58</a>
<a href="#">E21D17/022</a>	covered by	<a href="#">E21D17/02</a>
<a href="#">E21D17/05</a>	covered by	<a href="#">E21D17/02H</a> , <a href="#">E21D17/04</a>
<a href="#">E21D17/054</a>	covered by	<a href="#">E21D17/04</a>
<a href="#">E21D19/06</a>	covered by	<a href="#">E21D19/02</a> , <a href="#">E21D19/04</a>

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**Guide heading:** **Shafts**

#### E21D1/00

##### Sinking shafts

- E21D1/02 . by hand
- E21D1/03 . mechanically, [N: e.g. by loading shovels or loading buckets, scraping devices, conveying screws] ([E21D1/08](#) takes precedence)
- E21D1/04 . . with grabs [N: (boring grabs [E02F3/44](#), [E21B27/00](#); grab buckets for digging in general [E02F3/47](#))] [C9809]
- E21D1/06 . . with shaft-boring cutters (drilling machines [E21B](#), [E21C](#))
- E21D1/08 . while moving the lining downwards [N: (lowering the lining into a ready shaft [E21D5/01](#); sheet piles [E02D5/02](#))]
- E21D1/10 . Preparation of the ground [N: (for galleries or tunnels [E21D9/00B](#); improving or preserving foundation soil or rock [E02D3/00](#))]
- E21D1/10B . . [N: by water level modification]
- E21D1/12 . . by freezing [N: (freezing of foundation soil [E02D3/115](#))]
- E21D1/14 . . . Freezing apparatus
- E21D1/16 . . by petrification (grouting anchoring-bolts [E21D20/02](#); [N: consolidating foundation soil by placing solidifying or pore-filling substances in the soil [E02D3/12](#)])

#### E21D3/00

##### Raising shafts, i.e. working upwards from the bottom

- E21D5/00**      **Lining shafts; Linings therefor** ([E21D11/00](#) takes precedence; [N: sinking with simultaneous lowering of the lining [E21D1/08](#)])
- [E21D5/01](#)      .    using prefabricated lining lowered into a hole filled with liquid or viscous mass
- [E21D5/012](#)     .    Use of fluid-tight or anti-friction material on outside of, or between, lining layers
- [E21D5/016](#)     .    Bearer curbs
- [E21D5/02](#)      .    with wood ([E21D5/01](#), [E21D5/012](#), [E21D5/016](#) take precedence)
- [E21D5/04](#)      .    with brick, concrete, stone, or similar building materials ([E21D5/01](#), [E21D5/012](#), [E21D5/016](#) take precedence)
- [E21D5/06](#)      .    with iron or steel ([E21D5/01](#), [E21D5/012](#), [E21D5/016](#) take precedence)
- [E21D5/08](#)      .    .    in the form of profiled parts
- [E21D5/10](#)      .    .    in the form of tubing [N: or of rings composed of profile elements]
- [E21D5/11](#)      .    with combinations of different materials, e.g. wood, metal, concrete ([E21D5/01](#), [E21D5/012](#), [E21D5/016](#) take precedence)
- [E21D5/12](#)      .    Accessories for making shaft linings, e.g. suspended cradles, shutterings
- E21D7/00**      **Shaft equipment, e.g. timbering within the shaft** [N: (lifts in hoistways or mines [B66B15/00](#) to [B66B19/00](#))]
- [E21D7/00V](#)     .    [N: Determination of shaft lining deformation]
- [E21D7/02](#)      .    Arrangement of guides for cages in shafts; Connection of guides for cages to shaft walls ([guideways or guides for elevators \[B66B7/02\]\(#\)](#))
- E21D8/00**      **Shafts not provided for in groups E21D1/00 to E21D7/00** [N0704]
- Guide heading:**    **Tunnels; Galleries; Large underground chambers; Linings therefor** ([galleries protecting against falling rocks or avalanches \[E01F7/04\]\(#\)](#); [pressure galleries, galleries specially adapted to house pressure water conduits \[E02B9/06\]\(#\)](#); [tunnels or galleries specially adapted to house conduits in general \[E02D29/10\]\(#\)](#); [sewers \[E03F\]\(#\)](#))
- E21D9/00**      **Tunnels or galleries, with or without linings; Methods or apparatus for making thereof** ([E02D29/045](#), [E02D29/063](#) take precedence; linings per se [E21D11/00](#)); **Layout of tunnels or galleries**
- [E21D9/00B](#)     .    [N: Improving soil or rock, e.g. by freezing; Injections (for sinking shafts [E21D1/10](#); injection of liquids for binding dust [E21F5/18](#); improving or preserving foundation soil or rock [E02D3/00](#); borehole closures, i.e. packers, for use during the injection process [E21B33/12](#))]
- [E21D9/00B2](#)    .    .    [N: Injection methods characterised by the chemical composition used]
- [E21D9/00C](#)     .    [N: Arrangement of measuring or indicating devices for use during driving of tunnels,

- e.g. for guiding machines]
- E21D9/00C3 . . [N: using light beams for direction or position control]
- E21D9/00D . [N: by forcing prefabricated elements through the ground, e.g. by pushing lining from an access pit ([driving shields E21D9/06](#))]
- E21D9/00F . [N: by making use of blasting methods ([explosive compositions C06B](#); [blasting per se F42](#))]
- E21D9/00G . [N: Methods or devices for restoring the cross-section of tunnels, e.g. by equalising the floor]
- E21D9/02 . Driving inclined tunnels or galleries
- E21D9/04 . Driving tunnels or galleries through loose materials; Apparatus therefor not otherwise provided for [N:( [E21D9/00D](#), [E21D9/06](#) take precedence; soil improvement [E21D9/00B](#); provisional protective covers [E21D9/04](#))]
- E21D9/06 . Making by using a driving shield, [N: i.e. advanced by pushing means bearing against the already placed lining ([pushing prefabricated elements through the ground from an access pit E21D9/00D](#))]
- E21D9/06B . . [N: the shield being provided with devices for lining the tunnel, e.g. shuttering ([E21D9/08B2](#), [E21D9/08D2](#) take precedence; tail sealing means used as end shuttering [E21D9/06G](#))]
- E21D9/06D . . [N: Shield advancing devices]
- E21D9/06F . . [N: Control of the shields, e.g. of the hydraulic advancing cylinders ([arrangement of measuring or indicating devices for use during driving of tunnels E21D9/00C](#))]
- E21D9/06G . . [N: Tail sealing means, e.g. used as end shuttering]
- E21D9/06Z . . [N: Cutter drive shields]
- E21D9/08 . . with additional boring or cutting means [N: other than the conventional cutting edge of the shield]
- E21D9/08B . . . [N: with a rotary drilling head cutting simultaneously the whole front face]
- E21D9/08B2 . . . . [N: the shield being provided with devices for lining the tunnel, e.g. shuttering]
- E21D9/08D . . . [N: with a movable support arm carrying cutting tools for attacking the front face, e.g. a bucket]
- E21D9/08D2 . . . . [N: the shield being provided with devices for lining the tunnel, e.g. shuttering]
- E21D9/10 . Making by using boring or cutting machines ([E21D9/08](#) takes precedence; mining picks [E21C35/18](#))
- E21D9/10B . . [N: with rotary cutting tools ([for cutting simultaneously the whole cross-section E21D9/11](#); [drill bits E21B10/00](#))] [C0310]
- E21D9/10B2 . . . [N: on a tool-carrier supported by a movable boom]
- E21D9/10B2B . . . . [N: by a longitudinally extending boom being pivotable about a vertical and a transverse axis]
- E21D9/10B2B2 . . . . . [N: the tool-carrier being rotated about a transverse axis]
- E21D9/10B2C . . . . [N: by a transversely extending boom being pivotable about a longitudinal axis]
- E21D9/10B4 . . . [N: Cutting tool fixtures ([devices with percussive tools E21D9/10D](#))]

- E21D9/10B4D . . . . [N: Vibrating]
- E21D9/10C . . [N: for making a slit along the perimeter of the tunnel profile, the remaining core being removed subsequently, e.g. by blasting]
- E21D9/10D . . [N: with percussive tools, e.g. pick-hammers]
- E21D9/10G . . [N: with fluid jets (projecting hot gases [E21D9/10H](#); drilling by liquid or gas jets [E21B7/18](#); slitting by liquid jets [E21C25/60](#))]
- E21D9/10H . . [N: applying thermal energy, e.g. by projecting flames or hot gases, by laser beams (flame drilling [E21B7/14](#))]
- E21D9/10J . . [N: Remote control specially adapted for machines for driving tunnels or galleries (for machines for slitting or completely freeing the mineral [E21C35/24](#))]
- E21D9/10L . . [N: Drives or transmissions specially adapted therefor]
- E21D9/10M . . [N: Devices for supporting, advancing or orientating the machine or the tool-carrier (measuring devices for guiding machines [9/00C](#); anchoring in the borehole [E21B4/18](#))]
- E21D9/11 . . with a rotary drilling-head cutting simultaneously the whole cross-section, i.e. full-face machines [N0310]
- E21D9/11A . . . . [N: by means of heads or tool-carrying sectors implementing an oscillating rotary motion] [N0310]
- E21D9/11B . . . . [N: by means of one single rotary head or of concentric rotary heads ([E21D9/11A](#) takes precedence)] [N0310]
- E21D9/11B2 . . . . [N: having a central part for making a pilot tunnel and a follow-up part for enlarging the pilot tunnel ([E21D9/11B4](#) takes precedence; similar apparatus for enlarging drilled boreholes [E21B7/28](#))] [N0310]
- E21D9/11B4 . . . . [N: with cutting tools mounted pivotably or slidable on the head] [N0310]
- E21D9/11C . . . . [N: by means of non-concentric rotary heads ([E21D9/11A](#) takes precedence)] [N0310]
- E21D9/11C2 . . . . [N: mounted for orientating or sideways shifting relative to the frame] [N0310]
- E21D9/11C4 . . . . [N: with independently driven central head] [N0310]
- E21D9/12 . . Devices for removing or hauling away excavated material or spoil; Working or loading platforms (underground transport [E21F13/00](#))
- E21D9/12B . . [N: Working or loading platforms (underground transport [E21F13/00](#))] [N0310]
- E21D9/12H . . [N: Helical conveying means therefor ([E21D9/13](#) takes precedence)] [N0310]
- E21D9/12L . . [N: Loading devices or installations (loading platforms [E21D9/12B](#); soil-shifting machines [E02F3/00](#))] [N0310]
- E21D9/12L2 . . . . [N: Loader-conveyers with gathering arms] [N0310]
- E21D9/13 . . using hydraulic or pneumatic conveying means [N0310]
- E21D9/14 . . Layout of tunnels or galleries; Constructional features of tunnels or galleries, not otherwise provided for, e.g. portals, day-light attenuation at tunnel openings
- E21D11/00** **Lining tunnels, galleries or other underground cavities, e.g. large underground chambers; Linings therefor; Making such linings in situ, e.g. by assembling** ([E21D15/00](#) to [E21D23/00](#) take precedence; specially for shafts [E21D5/00](#); [N: driving shields in combination with means for lining the tunnel [E21D9/06](#)]; lining pressure water galleries, linings therefor [E02B9/06](#))
- E21D11/00B . . [N: Linings or provisions thereon, specially adapted for traffic tunnels, e.g. with built-in cleaning devices ([E21D11/38](#) takes precedence)]

- E21D11/00D . [N: Lining anchored in the rock (setting anchoring-bolts [E21D20/00](#); anchoring-bolts [E21D21/00](#))]
- E21D11/02 . Lining predominantly with wood
- E21D11/03 . . using timber- setting machines
- E21D11/04 . Lining with building materials ([E21D11/02](#), [E21D11/14](#) take precedence; [N: compositions of mortars, concrete or like building materials [C04B](#); placing filling-up materials in underground workings [E21F15/00](#)])
- E21D11/05 . . using compressible insertions
- E21D11/06 . . with bricks
- E21D11/07 . . . using brick- laying machines [N: (brick-laying machines per se [E04G21/22](#))]
- E21D11/08 . . with preformed concrete slabs [N: (backfilling the space between the slabs and the rock [E21D11/10C](#))]
- E21D11/08C . . . [N: Methods or devices for joining adjacent concrete segments]
- E21D11/10 . . with concrete cast in situ; Shuttering [N: also lost shutterings, e.g. made of blocks, of metal plates] or other equipment adapted therefor
- E21D11/10B . . . [N: Removable shuttering; Bearing or supporting devices therefor]
- E21D11/10C . . . [N: Transport or application of concrete specially adapted for the lining of tunnels or galleries (in building [E04F21/08](#), [E04G21/02](#)); Backfilling the space between main building element and the surrounding rock, e.g. with concrete]
- E21D11/10D . . . [N: Reinforcing elements therefor; Holders for the reinforcing elements]
- E21D11/12 . . Temporary supports for use during building [N: removable shutterings [E21D11/10B](#)]; Accessories [N: (provisional protective covers [E21D19/04](#))]
- E21D11/14 . Lining predominantly with metal [N: (backfilling the space between the lining elements and the rock [E21D11/10C](#))]
- E21D11/15 . . Plate linings; Laggings, i.e. linings designed for holding back formation material or for transmitting the load to main supporting members (insulation [E21D11/38](#))
- E21D11/15B . . . [N: Laggings made of grids or nettings]
- E21D11/15C . . . [N: Laggings made of strips, slats, slabs or sheet piles (longitudinal struts for mine arches [E21D11/28](#))]
- E21D11/15D . . . [N: Laggings making use of fluid cushions, e.g. the fluid containing a hardenable material (chocks made of flexible containers [E21D15/48F](#))]
- E21D11/18 . . Arch members; [N: Network made of arch members ([E21D11/36](#) takes precedence); Ring elements; Polygon elements; Polygon elements inside arches (caps for arches [E21D17/00](#))]
- E21D11/18D . . . [N: Supporting means for arch members, not provided for in [E21D11/22](#)]
- E21D11/18F . . . [N: Pre-stressing or dismantling devices therefor]
- E21D11/20 . . . Special cross- sections, e.g. corrugated [N: (for props [E21D15/502](#); for caps [E21D17/01](#))]
- E21D11/22 . . . Clamps or other yieldable means for interconnecting adjacent arch members either rigidly, or allowing arch member parts to slide when subjected to excessive pressure
- E21D11/24 . . . Knuckle joints or links between arch members
- E21D11/26 . . . Shoes for connecting arch members to longitudinal struts
- E21D11/28 . . Longitudinal struts, [N: i.e. longitudinal connections between adjoining arches]
- E21D11/30 . . Bases for lower arch members (for props [E21D15/54](#))

- E21D11/34 . . Joints between vertical props and horizontal top bars (end caps forming part of the props [E21D15/54](#); [N: retaining plates on caps for engaging the tops of pit-props [E21D17/10](#)])
- E21D11/36 . . Linings or supports specially shaped for tunnels or galleries of irregular cross-section
- E21D11/36B . . . [N: for loading areas (lining shafts [E21D5/00](#))]
- E21D11/36C . . . [N: for intersecting galleries]
- E21D11/36D . . . [N: for junction with the longwall coal face (walking supports therefor [E21D23/00K2](#))]
- E21D11/38 . Waterproofing (in general [E02D31/00](#)); Heat insulating; Soundproofing; Electric insulating (for building constructions in general [E04B1/62](#))
- E21D11/38B . . [N: Setting apparatus or devices]
- E21D11/38F . . [N: by applying waterproof flexible sheets; Means for fixing the sheets to the tunnel or cavity wall]
- E21D11/38J . . [N: Sealing means positioned between adjacent lining members (for joints in foundation structures [E02D29/16](#); for sewers [E03F3/04](#); for building structures in general [E04B1/68](#))]
- E21D11/40 . Devices or apparatus specially adapted for handling or placing units of linings [N: or supporting units] for tunnels or galleries [N: (combined with tunnelling shields [E21D9/06](#))]
- E21D11/40M . . [N: combined with the head machine]
- E21D13/00** **Large underground chambers; Methods or apparatus for making them (lining [E21D11/00](#))**
- Guide heading:** **Working-face supports**
- E21D15/00** **Props (in the building art [E04G25/00](#)); Chocks, [N: e.g. made of flexible containers filled with backfilling material]**
- E21D15/00B . [N: Auxiliary devices in which the prop type is not essential (setting or withdrawing props or chocks [E21D15/58](#), [E21D15/60](#))]
- E21D15/00M . [N: characterised by the material]
- E21D15/00M2 . . [N: spark-reducing]
- E21D15/02 . Non-telescopic props
- E21D15/04 . . with wooden prop parts joined by double conical connectors
- E21D15/06 . . with parts joined by a lock, with or without slight axial adjustability
- E21D15/08 . . . with toggle joint connection
- E21D15/10 . . . with dog-clutch or pin-and-hole connection
- E21D15/12 . . . with locking devices located near head or foot [N: ([E21D15/08](#) and [E21D15/10](#) take precedence)]
- E21D15/14 . Telescopic props (general means for fixing telescopic parts together [N: [F16B7/10](#)])
- E21D15/15 . . Means counteracting entry of dirt; Built-in cleaning devices

- E21D15/15D . . . [N: Built-in cleaning devices]
- E21D15/16 . . with parts held together by positive means, with or without relative sliding movement when the prop is subject to excessive pressure
- E21D15/18 . . . with one part resting on a supporting medium, e.g. rubber, sand, bitumen, lead, located in the other part, with or without expulsion or displacement of the medium upon excessive pressure [N: (clamping pressure between telescopic prop elements by means of granular material [E21D15/30B](#))]
- E21D15/20 . . . with pawl, pin, cross-piece, or the like engaging with ratchet teeth, notches, holes, or the like, spaced apart at intervals
- E21D15/22 . . . with member, pin, cross- piece, or the like, ruptured, sheared through, or permanently deformed upon excessive pressure
- E21D15/24 . . . with axial screw-and-nut, rack-and-worm, or like mechanism
- E21D15/26 . . . . with screw, worm, or the like, not self-locking but normally prevented from rotation by friction members which slip upon excessive pressure
- E21D15/28 . . with parts held relatively to each other by friction or gripping
- E21D15/28W . . . [N: by means of wedges or wedge combinations (details of wedges [E21D15/43](#))]
- E21D15/30 . . . by means expanded or contracted by pressure applied through the medium of a fluid or quasi- fluid, e.g. rubber [N: (setting props [E21D15/58H2F](#), [E21D15/58H6](#))]
- E21D15/30B . . . . [N: by means of granular material (supporting by means of granular material [E21D15/18](#))]
- E21D15/30H . . . . [N: by means of a liquid]
- E21D15/32 . . . by a deformable collar [N: or clamping means applied symmetrically inside a locking ring]
- E21D15/32K . . . . [N: by a clamping ring]
- E21D15/34 . . . by axially- moving balls, rollers, or the like
- E21D15/36 . . . by a tiltable collar surrounding one or both parts
- E21D15/38 . . . with longitudinally-divided upper or lower prop parts, e.g. interfitting laminations
- E21D15/40 . . . Collar or other support gripped to one or both parts by toggle-action, cam, or other member pivoted or similarly mounted
- E21D15/42 . . . with special parts to influence the friction
- E21D15/43 . . . Details of wedges (friction linings or pads [E21D15/42](#))
- E21D15/43H . . . . [N:hydraulic]
- E21D15/44 . . Hydraulic, pneumatic, or hydraulic-pneumatic props [N: see also [E21D15/51](#)]
- E21D15/44V . . . [N: comprising a fluid cushion]
- E21D15/45 . . . having closed fluid system, e.g. with built-in pumps or accumulators
- E21D15/46 . . with load-measuring devices; with alarm devices
- E21D15/46H . . . [N: with essential hydraulic or pneumatic details]
  
- E21D15/48 . Chocks or the like
- E21D15/48F . . [N: made of flexible containers, e.g. inflatable, with or without reinforcement, e.g. filled with water, backfilling material or the like (laggings making use of fluid cushions [E21D11/15D](#))]
- E21D15/48H . . [N: with essential hydraulic or pneumatic details]
  
- E21D15/50 . Component parts or details of props ([E21D15/43](#), [E21D15/58](#), [E21D15/60](#) take precedence)

- E21D15/502 . . Prop bodies characterised by their shape, e.g. of specified cross-section
- E21D15/51 . . specially adapted to hydraulic, pneumatic, or hydraulic-pneumatic props, e.g. arrangements of relief valves [N: not used, see subgroups and [E21D15/44](#)]
- E21D15/51B . . . [N: Arrangement of valves (external control of roof support installations [E21D23/12](#), [E21D23/26](#))]
- E21D15/51D . . . [N: Particular fluids not covered by any chemical subdivision]
- E21D15/51F . . . [N: Extension elements]
- E21D15/52 . . Extensible units located above or below standard props (for allowing step-by-step movement of cap [E2123/06](#); setting props or chocks [E21D15/58](#))
- E21D15/52H . . . [N: with hydraulic or pneumatic control]
- E21D15/52V . . . [N: for step-by-step extension of the prop]
- E21D15/54 . . Details of the ends of props (for permitting step-by-step movement [E21D23/06](#))
- E21D15/54H . . . [N: hydraulic or pneumatic]
- E21D15/55 . . . of prop heads [N: or feet]
- E21D15/56 . . Details of locks of telescopic props
- E21D15/56D . . . [N: by which a series of similarly shaped props can obtain an almost equal load-capacity (setting props or chocks [E21D15/58F](#), [E21D15/58H6](#))]
- E21D15/56H . . . [N: comprising a fluid cushion]
  
- E21D15/58 . Devices for setting props or chocks
- E21D15/58D . . [N: in which the props are pre- loaded (extensible elements at strut extremities [E21D15/52](#))]
- E21D15/58D2 . . . [N: by means of power accumulators to be pre-charged by rock pressure (by means of hydraulically operated devices [E21D15/58H2D](#))]
- E21D15/58D4 . . . [N: in which the lock is also activated]
- E21D15/58F . . [N: in which a series of similarly shaped props obtain an almost equal load capacity by removable devices (idem for extensible props [E21D15/56D](#))]
- E21D15/58H . . [N: by means of hydraulically operated devices for mechanical props, or hydraulic props in which the hydraulic part is not important (hydraulic props in which the hydraulic part is important [E21D15/44](#))]
- E21D15/58H2 . . . [N: the props being pre-loaded]
- E21D15/58H2D . . . . [N: by means of power accumulators to be pre-charged by rock pressure]
- E21D15/58H2F . . . . [N: the lock also being activated]
- E21D15/58H6 . . . [N: in which a series of similarly shaped props are given almost equal load capacity by removable devices]
  
- E21D15/60 . Devices for withdrawing props or chocks
- E21D15/60H . . [N: by means of hydraulic devices]
- E21D15/60J . . [N: the props being moved systematically (mine roof supports for step-by-step movement [E21D23/00](#))] [C9608]
  
- E21D17/00            Caps for supporting mine roofs**
  
- E21D17/00H . . [N: with essential hydraulic elements]
- E21D17/00M . . [N: characterised by the material]
- E21D17/01 . . characterised by the shape of the cap, e.g. of specified cross-section

- E21D17/02 . Cantilever extension or similar protecting devices
- E21D17/02H . . [N: Hydraulically operated extension devices]
- E21D17/02J . . [N: Assembling devices for pivoting caps upwardly]
- E21D17/03 . . Brackets for roof-supporting bars
- E21D17/04 . . for use in longwall working
- E21D17/06 . . for use in drifting galleries
- E21D17/08 . . Cap joints for obtaining a coal-face free of pit-props
- E21D17/082 . . . of sliding type
- E21D17/086 . . . or articulated type
  
- E21D17/10 . Details of mine caps for engaging the tops of pit-props, with or without retaining-plates; Retaining-plates
  
- E21D19/00** **Provisional protective covers for working space** ([E21D9/06](#), [E21D23/00](#) take precedence)
  
- E21D19/02 . for use in longwall working
- E21D19/04 . for use in drifting galleries
  
- E21D20/00** **Setting anchoring-bolts** (anchoring bolts for shafts, tunnels or galleries [E21D21/00](#); means for anchoring structural elements or bulkheads specially adapted to foundation engineering [E02D5/74](#); dowels or other devices fastened in walls or the like by inserting them in holes made therein for that purpose [F16B13/00](#))
  
- E21D20/00G . [N: Machines for drilling anchor holes and setting anchor bolts]
- E21D20/00G2 . . [N: having magazines for storing and feeding anchoring-bolts (combined feeding from racks and connecting of drill rods or the like [E21B19/20](#))]
  
- E21D20/02 . with provisions for grouting
- E21D20/02B . . [N: Grouting with inorganic components, e.g. cement]
- E21D20/02B2 . . . [N: Cartridges; Grouting charges]
- E21D20/02D . . [N: Grouting with organic components, e.g. resin]
- E21D20/02D2 . . . [N: Cartridges; Grouting charges]
- E21D20/02G . . [N: Devices or accesories for injecting a grouting liquid in a bore-hole ([E21D20/00G](#) takes precedence; improving soil or rock by injections [E21D9/00B](#))]
  
- E21D21/00** **Anchoring-bolts for roof, floor** [N: in galleries or longwall working], **or shaft-lining protection** ([N: ground anchors [E02D5/80](#); anchorings for building constructions [E04B1/41](#), [E21D2/30](#)]; dowels or other devices fastened in walls or the like by inserting them in holes made therein for that purpose [F16B13/00](#); [N: bolts with visible load [G01L1/00](#)])
  
- E21D21/00B . [N: characterised by the bolt material]
- E21D21/00C . [N: Protection against corrosion]
- E21D21/00H . [N: using explosives charges]

- E21D21/00M . [N: characterised by constructional features of the bolts]
- E21D21/00M2 . . [N: having a jacket or outer tube] [N0308]
- E21D21/00M4 . . [N: Bolts held in the borehole by friction all along their length, without additional fixing means]
- E21D21/00M6 . . [N: formed by a plurality of elements arranged longitudinally] [N0308]
- E21D21/00N . [N: Anchoring or tensioning means]
- E21D21/00P . [N: Bearing plates]
- E21D21/00S . [N: Accessories]
- E21D21/02 . having means for indicating tension (screwed connections specially modified for indicating tensile load [F16B31/02](#))

**E21D23/00**

**Mine roof supports for step- by- step movement, e.g. in combination with provisions for shifting of conveyers, mining machines, or guides therefor [(N: transport of mine roof support units [E21F13/00D2](#); shifting of mine conveyers at the working face [E21F13/08](#))]**

- E21D23/00C . [N: along the working face]
- E21D23/00C2 . . [N: comprising a pair of joined struts]
- E21D23/00C4 . . [N: Frame type supports]
- E21D23/00C6 . . [N: Pile type supports]
- E21D23/00C6B . . . [N: comprising two walking elements]
- E21D23/00C6C . . . [N: comprising three walking elements]
- E21D23/00C6D . . . [N: consisting of a rigid pile]
- E21D23/00C8 . . [N: comprising a goaf shield articulated to a base member]
- E21D23/00C8B . . . [N: and supported by a strut or by a row of struts parallel to the working face]
- E21D23/00C8C . . . [N: and supported by two or more rows of struts parallel to the working face]
- E21D23/00D . [N: without essential shifting devices]
- E21D23/00F . [N: with advancing shifting devices connected therewith]
- E21D23/00G . [N: with individual advancing shifting devices]
- E21D23/00H . [N: provided with essential hydraulic devices]
- E21D23/00H2 . . [N: driven, or automatically, e.g. electrically-hydraulically controlled]
- E21D23/00H4 . . [N: without essential advancing shifting devices]
- E21D23/00H6 . . [N: with advancing shifting devices connected therewith]
- E21D23/00H8 . . [N: with individual shifting devices]
- E21D23/00J . [N: specially adapted for vertical or steep gradient seams]
- E21D23/00K . [N: in galleries]
- E21D23/00K2 . . [N: at the junction with the working face]

- E21D23/00K4 . . [N: Temporary supports at the driving front]
- E21D23/03 . having protective means, e.g. shields, for preventing or impeding entry of loose material into the working space or support
- E21D23/04 . Structural features of the supporting construction, e.g. linking members between adjacent frames or sets of props; Means for counteracting lateral sliding on inclined floor ([E21D23/14](#) takes precedence)
- E21D23/04B . . [N: Aligning or guiding means for the supports or for the constitutive parts of the supports]
- E21D23/04C . . [N: Positioning devices and stabilizing means for the props]
- E21D23/04F . . [N: Shield operating devices; Hinges therefor]
- E21D23/04G . . [N: Means for inclining the base member of the support]
- E21D23/04H . . [N: Extensions of the base member supporting the conveyer]
- E21D23/04J . . [N: Trailing plates; Coal face or goaf side sprags (specially adapted for the placing of filling-up materials [E21D23/04M](#))]
- E21D23/04K . . [N: Hanging or shifting means for tubes, electric feeding cables or the like]
- E21D23/04L . . [N: Supports specially adapted for people walking or transporting material]
- E21D23/04M . . [N: Supports specially adapted for use in combination with the placing of filling-up materials (placing filling-up materials in underground workings per se [E21F15/00](#))]
- [N: **WARNING**  
Group [E21D23/04M](#) is not complete. See also other groups of [E21D23/00](#)  
]
- E21D23/04P . . [N: Connecting devices between the head or foot of a prop and the cap or base of the roof support]
- E21D23/06 . . Special mine caps or special tops of pit-props for permitting step-by-step movement
- E21D23/06C . . . [N: Retractable cantilever extensions therefor]
- E21D23/06D . . . [N: Pivoted cantilever extensions therefor]
- E21D23/08 . Advancing mechanisms ([E21D23/16](#) takes precedence)
- E21D23/08B . . [N: forming parts of the roof supports]
- E21D23/08B2 . . . [N: acting solely on the elements of the supports]
- E21D23/08B4 . . . [N: acting on a firm abutment adapted thereto]
- E21D23/08B6 . . . [N: acting on a conveyer or a guide for the mining machine]
- E21D23/08B6B . . . . [N: Details of fixing devices therefor]
- E21D23/08B8 . . . [N: acting directly on the walls of the seam]
- E21D23/08B8B . . . . [N: by means of wheels, rollers, caterpillars, belts or worm screws]
- E21D23/10 . . with advancing devices separate from the supporting construction
- E21D23/12 . Control, e.g. using remote control ([E21D23/16](#) takes precedence)
- E21D23/14 . . Effecting automatic sequential movement of supports, e.g. one behind the other ([N: advancing of mining machines toward the working face [E21C29/02](#); advancing of conveyers toward the working face [E21D23/08B6](#)] [C0410])
- E21D23/16 . Hydraulic or pneumatic features, e.g. circuits, arrangement or adaptation of valves, setting or retracting devices

- E21D23/18 . . of advancing mechanisms
- E21D23/20 . . . for sequential movement, e.g. one behind the other
- E21D23/22 . . . incorporated in mine caps
- E21D23/24 . . . the advancing mechanisms being separate from the supporting construction
- E21D23/26 . . Hydraulic or pneumatic control