

CPC**COOPERATIVE PATENT CLASSIFICATION****E21F****SAFETY DEVICES, TRANSPORT, FILLING-UP, RESCUE, VENTILATION, OR DRAINING IN OR OF MINES OR TUNNELS****Guidance heading:** Ventilation of mines or tunnels**E21F 1/00** **Ventilation of mines or tunnels; Distribution of ventilating currents** (ventilating rooms or spaces in general [F24F](#))E21F 1/003 . { [Ventilation of traffic tunnels](#) (during construction [E21F 1/04](#) to [E21F 3/00](#)) }E21F 1/006 . { [Ventilation at the working face of galleries or tunnels](#) }E21F 1/02 . Test models (analogue computers therefor [G06G 7/50](#))E21F 1/04 . Air ducts (suspension devices [E21F 17/02](#))E21F 1/06 . . Duct connections (tube connections in general [F16L](#))E21F 1/08 . Ventilation arrangements in connection with air ducts, e.g. arrangements for mounting ventilators ({ [E21F 1/003](#) takes precedence } ; ventilators in general [F04D](#))E21F 1/085 . . { [using compressed gas injectors](#) }E21F 1/10 . Air doors ({ [E21F 1/003](#) takes precedence ; air locks [E21F 1/145](#) ; dam doors [E21F 17/12](#) } ; doors in general [E06B](#))

E21F 1/12 . . Devices for automatically opening air doors

E21F 1/14 . Air partitions; Air locks ({ [E21F 1/003](#) takes precedence } ; dams [E21F 17/103](#) ; air locks for foundations [E02D](#))E21F 1/145 . . { [Air locks](#) (air doors [E21F 1/10](#) ; dam doors [E21F 17/12](#)) }

E21F 1/16 . Shaft covers

E21F 1/18 . Gravity flow ventilation ([E21F 1/02](#) to [E21F 1/16](#) take precedence)**E21F 3/00** **Cooling or drying of air** (air-conditioning rooms or spaces in general [F24F](#))**Guidance heading:** Safety devices ([flue-gas indicators G01N](#)) ; Rescue devices**E21F 5/00** **Means or methods for preventing, binding, depositing, or removing dust** { (in combination with mining machines [E21C 35/22](#)) } ; **Preventing explosions or fires** (dams [E21F 17/103](#) ; applying liquids or other fluent materials to surfaces in general [B05](#))

E21F 5/02 . by wetting or spraying

- E21F 5/04 .. Spraying barriers ([spray nipples](#), [spraying in general B05B](#), [B05D](#); [picks with arrangements of fluid-spraying nozzles E21C 35/187](#))
- E21F 5/06 .. Fluids used for spraying
- E21F 5/08 . Rock dusting of mines; Depositing other protective substances
- E21F 5/10 .. Devices for rock dusting
- E21F 5/12 .. Composition of rock dust
- E21F 5/14 . Fluid barriers or rock dusters made to work by, or at the same time as, shots or explosions
- E21F 5/143 .. { [Fluid barriers](#) }
- E21F 5/146 .. { [Rock dusters](#) }
- E21F 5/16 . Layers of hygroscopic or other salts deposited on floors, walls, or the like, for binding dust; Deposition of such layers ([dust-absorbing materials in general C09K 3/22](#))
- E21F 5/18 . Impregnating walls, or the like, with liquids for binding dust {([injections for improving soil or rock E21D 9/001](#); [borehole closures, i.e. packers, for use during the injection process E21B 33/12](#))}
- E21F 5/20 . Drawing-off or depositing dust ([dust-removing while drilling E21C 7/00](#); [while slitting E21C 35/22](#))
- E21F 7/00 Methods or devices for drawing- off gases with or without subsequent use of the gas for any purpose**
- E21F 9/00 Devices preventing sparking of machines or apparatus** ([preventing sparking of electric machines or apparatus H01K](#), [H02K](#))
- E21F 11/00 Rescue devices or other safety devices, e.g. safety chambers, escape ways** ([respiratory apparatus A62B 7/00](#); [revival apparatus A62B 33/00](#); [breathing aids for curative purposes A61H 31/00](#))
- E21F 13/00 Transport specially adapted to underground conditions** ([mine cars B61D](#); [transport in general, loading { unless specially adapted to underground conditions }B65G](#))
- E21F 13/002 . { [Crushing devices specifically for conveying in mines](#) }
- E21F 13/004 . { [Staff transport system](#) }
- E21F 13/006 . { [Equipment transport systems](#) }
- E21F 13/008 .. { [for mine roof support units for step-by-step movement](#) }
- E21F 13/02 . { [Transport of mined mineral](#) } in galleries
- E21F 13/025 .. { [Shuttle cars](#) }

- E21F 13/04 . { Transport of mined material } in gravity inclines; in staple or inclined shafts
- E21F 13/042 .. { Vertical hydraulic conveying of coal (conveying by water flow in general [B65G 53/00](#))}
- E21F 13/045 .. { Bunkers specially adapted for mining purposes (chutes in general [B65G 11/00](#))}
- E21F 13/047 .. { comprising helically running channels (chutes of helical form in general [B65G 11/06](#))}

- E21F 13/06 . { Transport of mined material } at or adjacent to the working face
- E21F 13/061 .. { Chutes and braking conveyers for average and steep slopes, adapted for mining purposes (chutes in general [B65G 11/00](#))}
- E21F 13/063 .. { Loading devices for use in mining }
- E21F 13/065 ... { Scrapers (digging devices guided by cables [E02F 3/54](#); combined with planing means [E21C 27/42](#))}
- E21F 13/066 .. { Scraper chain conveyers (in general [B65G 19/00](#))}
- E21F 13/068 ... { Special adaptations for use at the junction of the working face with the gallery, e.g. driving stations coupled to the driving station of the winning machine }

- E21F 13/08 . Shifting conveyers or other transport devices from one location at the working face to another (guiding mining machines along conveyers for the cut mineral [E21C 35/12](#); in combination with mine roof supports for step-by-step movement [E21D 23/00](#))
- E21F 13/083 .. { Conveyor belts removing methods or devices }
- E21F 13/086 .. { Armoured conveyers shifting devices }

- E21F 13/10 . Anchorings for conveyers

- E21F 15/00** **Methods or devices for placing filling-up materials in underground workings** (dams [E21F 17/103](#); { chocks made of flexible containers filled with backfilling material [E21D 15/483](#) })

- E21F 15/005 . { characterised by the kind or composition of the backfilling material }

- E21F 15/02 . Supporting means, e.g. shuttering, for filling-up materials
- E21F 15/04 .. Stowing mats; Goaf wire netting; Partition walls

- E21F 15/06 . Filling-up mechanically

- E21F 15/08 . Filling-up hydraulically or pneumatically (hydraulic or pneumatic transport devices [B65G](#); pipes, pipe couplings [F16L](#))
- E21F 15/10 .. Hydraulic or pneumatic filling-up machines

- E21F 16/00** **Drainage** (keeping dry foundation sites or other areas in the ground [E02D 19/00](#))

- E21F 16/02 . of tunnels

- E21F 17/00** **Methods or devices for use in mines or tunnels, not covered elsewhere** (mine lighting [F21](#), [H05B](#))
- E21F 17/02 . Suspension devices for tubes or the like, e.g. for ventilating ducts (supporting pipes, cables or protective tubing in general [F16L 3/00](#) to [F16L 7/00](#))
- E21F 17/04 . Distributing means for power supply in mines
- E21F 17/06 . . Distributing electric power; Cable networks; Conduits for cables (circuit arrangements for supplying or distributing electric power in general [H02J](#))
- E21F 17/08 . . Distributing hydraulic power; Pipe networks for hydraulic liquid (pipe-line systems in general [F17D](#))
- E21F 17/10 . . Distributing pneumatic power; Pipe networks for compressed air (pipe-line systems in general [F17D](#))
- E21F 17/103 . Dams, e.g. for ventilation
- E21F 17/107 . . inflatable
- E21F 17/12 . . Dam doors {(air doors [E21F 1/10](#); air locks [E21F 1/145](#))}
- E21F 17/16 . Modification of mine passages or chambers for storage purposes, especially for liquids or gases (storing fluids in natural or artificial cavities or chambers in the earth [B65G 5/00](#))
- E21F 17/18 . Special adaptations of signalling or alarm devices (for mine lifts [B66B](#); gas-sensitive devices per se [G01N](#))
- E21F 17/185 . . { Rock-pressure control devices with or without alarm devices; Alarm devices in case of roof subsidence (props with load-measuring devices [E21D 15/46](#))}