

**CPC****COOPERATIVE PATENT CLASSIFICATION****E21F****SAFETY DEVICES, TRANSPORT, FILLING-UP, RESCUE, VENTILATION, OR DRAINING IN OR OF MINES OR TUNNELS****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](#))

**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
  - . . {Conveyer 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](#))}