

**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 . . {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](#))}