

E21D

SHAFTS; TUNNELS; GALLERIES; LARGE UNDERGROUND CHAMBERS (soil-conditioning or soil-stabilising materials [C09K 17/00](#) ; drilling or cutting machines for mining or quarrying [E21C](#); safety devices, transport, rescue, ventilation or drainage [E21F](#))

Definition statement

This subclass/group covers:

Methods or apparatus for making or lining tunnels, galleries or large underground chambers, using underground mining methods only, i.e. not involving disturbance of the ground surface.

Techniques and tools for stabilising such underground constructions against the pressure of the surrounding soil or rock.

References relevant to classification in this subclass

This subclass/group does not cover:

Soil conditioning or soil stabilising materials	C09K 17/00
Underground spaces made by foundation engineering, i.e. involving disturbance of the ground surface.	E02D
Deep drilling for obtaining oil, gas or water	E21B
Drilling or cutting machines for mining or quarrying	E21C
Safety devices, transport, rescue, ventilation or drainage	E21F

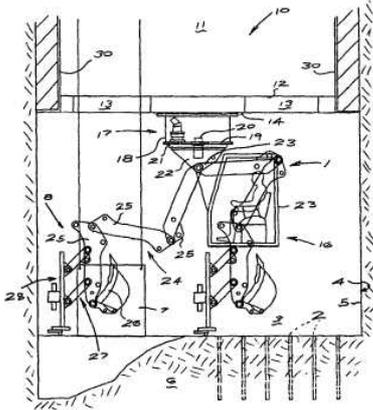
E21D 1/00

Sinking shafts

Definition statement

This subclass/group covers:

Vertical excavation of shafts from the surface and removal of cuttings:



Special rules of classification within this group

Shafts can also be used as a starting point for the excavation of tunnels or for the excavation of galleries or horizontal bores for the production of hydrocarbons. Only the specific technical details disclosed relative to each part of the operative sequence should be classified in the corresponding groups.

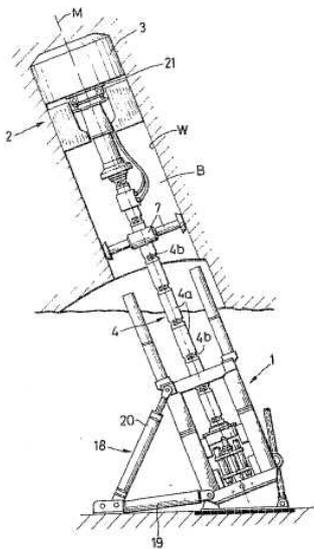
E21D 3/00

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

Definition statement

This subclass/group covers:

Shafts starting from a gallery at a lower level, and which can be made by a single boring machine or by drilling multiple boreholes:



References relevant to classification in this group

This subclass/group does not cover:

Making drillholes for rock anchors	E21D 20/003
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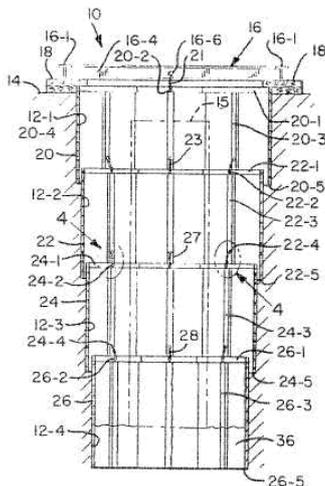
E21D 5/00

Lining shafts; Linings therefor ([E21D 11/00](#) takes precedence; [N: sinking with simultaneous lowering of the lining [E21D 1/08](#)])

Definition statement

This subclass/group covers:

Methods, materials and apparatuses for lining a shaft, regardless of the method of excavation:



References relevant to classification in this group

This subclass/group does not cover:

Sinking with simultaneous lowering of the lining	E21D 1/08
Lining tunnels or galleries	E21D 11/00

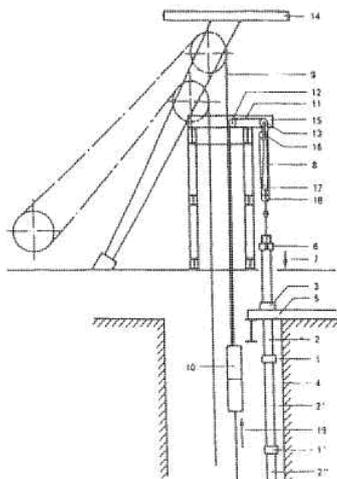
E21D 7/00

Shaft equipment, e.g. timbering within the shaft [N: (lifts in hoistways or mines [B66B 15/00](#) to [B66B 19/00](#))]

Definition statement

This subclass/group covers:

Equipment installed permanently or removably in the shaft other than excavating or lining equipment



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References relevant to classification in this group

This subclass/group does not cover:

Lifts in hoistways or mines	B66B 15/00 to B66B 19/00
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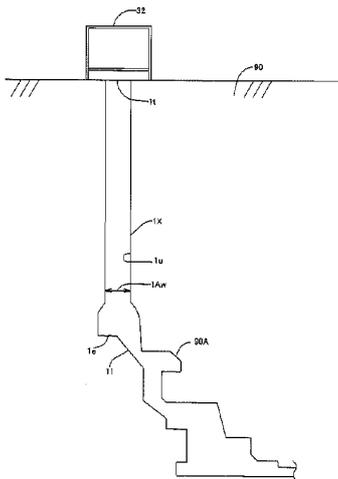
E21D 8/00

Shafts not provided for in groups [E21D 1/00](#) to [E21D 7/00](#)

Definition statement

This subclass/group covers:

Shafts characterised by features other than the excavation form or the lining installed, such as by a particular layout:



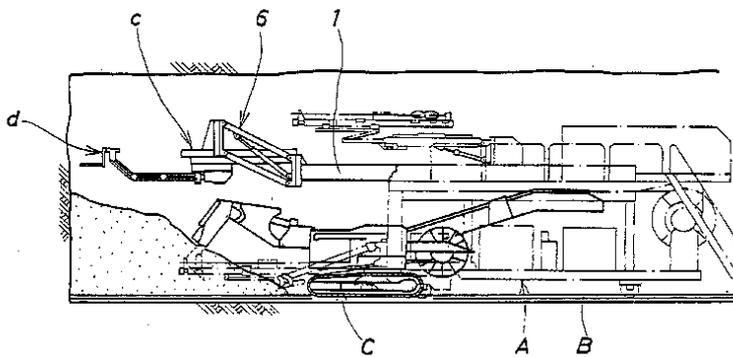
E21D 9/00

Tunnels or galleries, with or without linings; Methods or apparatus for making thereof ([E02D 29/045](#), [E02D 29/063](#) take precedence; linings per se [E21D 11/00](#)); Layout of tunnels or galleries

Definition statement

This subclass/group covers:

Methods or apparatus for excavating tunnels. This includes the stabilisation of the soil prior to the excavation, and the constructive details of the tunnel boring machines:



References relevant to classification in this group

This subclass/group does not cover:

Tunnel linings per se	E21D 11/00
Laying of pipes by horizontal earth drilling techniques	E21B 7/046

Tunnels submerged into, or built in, open water	E02D 29/063
Tunnels or galleries, built in the open air or by methods involving disturbance of the ground surface all along the location line	E02D 29/045

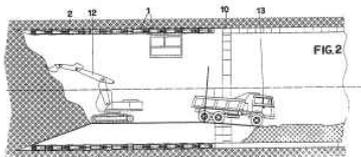
E21D 9/06

Making by using a driving shield, i.e. advanced by pushing means bearing against the already placed lining

Definition statement

This subclass/group covers:

Making by using a driving shield, i.e. advanced by pushing means bearing against the already placed lining; Tunnel boring machines featuring driving shields with a cutting action or for protection against collapse of the tunnel:



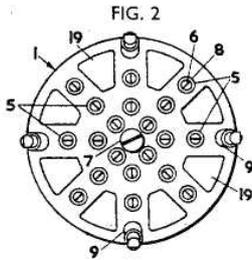
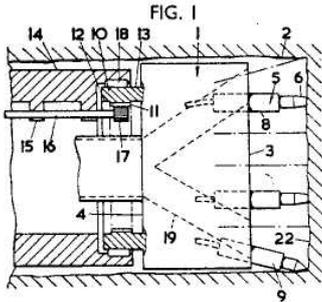
E21D 9/10

Making by using boring or cutting machines ([E21D 9/08](#) takes precedence; mining picks [E21C 35/18](#))

Definition statement

This subclass/group covers:

Tunnel boring machines for which no driving shield is mentioned:



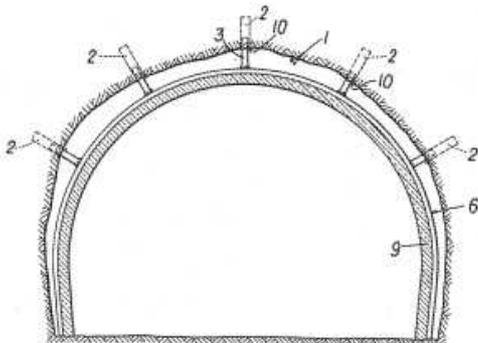
E21D 11/00

Lining tunnels, galleries or other underground cavities, e.g. large underground chambers; Linings therefor; Making such linings in situ, e.g. by assembling ([E21D 15/00](#) to [E21D 23/00](#) take precedence; specially for shafts [E21D 5/00](#); [N: driving shields in combination with means for lining the tunnel [E21D 9/06](#)]; lining pressure water galleries, linings therefor [E02B 9/06](#))

Definition statement

This subclass/group covers:

Materials, methods and machines for lining the surface of an excavated tunnel:



Relationship between large subject matter areas

[E21D 9/06](#) has several subgroups relative to a combination of driving shield

and devices for lining the tunnel. The specific details of the lining operation are also classified in the corresponding subgroup under [E21D 11/00](#).

References relevant to classification in this group

This subclass/group does not cover:

Setting anchoring bolts	E21D 20/00
Anchoring bolts	E21D 21/00
Linings specially for shafts	E21D 5/00

Informative references

Attention is drawn to the following places, which may be of interest for search:

Driving shields in combination with means for lining the tunnel	E21D 9/06
Lining pressure water galleries, linings therefor	E02B 9/06

Special rules of classification within this group

Documents mentioning aspects of lining, but focussing on the details covered by groups [E21D 15/00](#) to [E21D 23/00](#) are classified only in those groups.

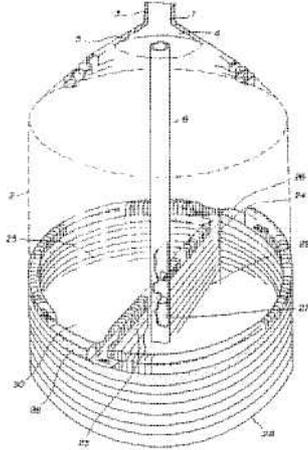
E21D 13/00

Large underground chambers; Methods or apparatus for making them (lining [E21D 11/00](#))

Definition statement

This subclass/group covers:

Underground chambers having a three-dimensional volume, in contrast with vertical linear cavities (shafts) or with horizontal linear cavities (tunnels)



References relevant to classification in this group

This subclass/group does not cover:

Modification of passages or chambers for storage purposes	E21F 17/16
Linings per se	E21D 11/00

Informative references

Attention is drawn to the following places, which may be of interest for search:

Storing fluids in natural or artificial cavities or chambers in the earth	B65G 5/00
Modification of mine passages or chambers for storage purposes, especially for liquids or gases	E21F 17/16

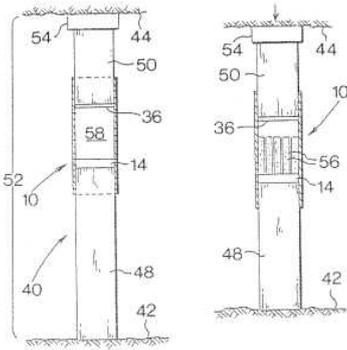
E21D 15/00

Props; (in the building art [E04G 25/00](#)); Chocks, [N: e.g. made of flexible containers filled with backfilling material]

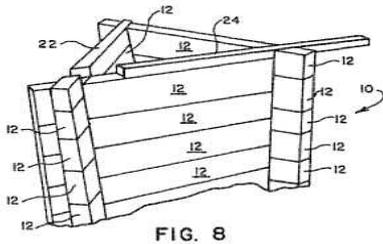
Definition statement

This subclass/group covers:

Props:



Chocks or cribs:



References relevant to classification in this group

This subclass/group does not cover:

Props in the building art	E04G 25/00
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Special rules of classification within this group

Props forming part of supports for step-by-step movement are classified in [E21D 23/00](#). If one such prop contains specific details not covered by [E21D 23/00](#), then it should also be classified in [E21D 15/00](#).

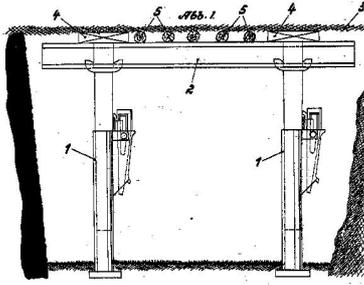
E21D 17/00

Caps for supporting mine roofs

Definition statement

This subclass/group covers:

A cap is understood as the roof or top piece in a three-piece structure used for tunnel support. A piece of plank or timber or a beam placed on top of a prop, stull, or post. The horizontal member of a set of timber used as a roadway support:



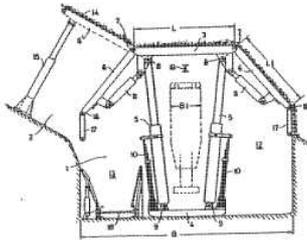
E21D 19/00

Provisional protective covers for working space ([E21D 9/06](#), [E21D 23/00](#) take precedence)

Definition statement

This subclass/group covers:

Means for protecting a work area from rocks falling from the roof or tunnels other than the final lining. This provisional lining can be in the form of movable shields, caps or covers, of mobile or temporary roof supports, or of linings fixed to the walls and intended to be supplemented by additional lining at a subsequent stage:



Special rules of classification within this group

Documents mentioning aspects of provisional support by way of a driving shield for tunnels, or of mine roof supports for step-by-step movement, are classified instead in [E21D 9/06](#) and in [E21D 23/00](#) respectively.

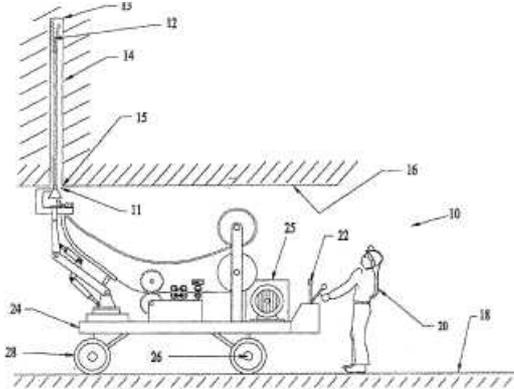
E21D 20/00

Setting anchoring-bolts (anchoring bolts for shafts, tunnels or galleries [E21D 21/00](#); means for anchoring structural elements or bulkheads specially adapted to foundation engineering [E02D 5/74](#); dowels or other devices fastened in walls or the like by inserting them in holes made therein for that purpose [F16B 13/00](#))

Definition statement

This subclass/group covers:

Methods and machines for installing anchoring bolts or rock bolts, including machines for drilling a hole and inserting an bolt in combination. Under this main group is also classified the use of resins or mortars for fixing anchoring-bolts:



References relevant to classification in this group

This subclass/group does not cover:

Means for anchoring structural elements or bulkheads specially adapted to foundation engineering	E02D 5/74
Anchoring bolts for shafts, tunnels or galleries	E21D 21/00
Dowels or other devices fastened in walls or the like by inserting them in holes made therein for that purpose	F16B 13/00

Informative references

Attention is drawn to the following places, which may be of interest for search:

Removing dust	B23Q 11/0046
Cleaning by suction	B25D17/18

E21D 21/00

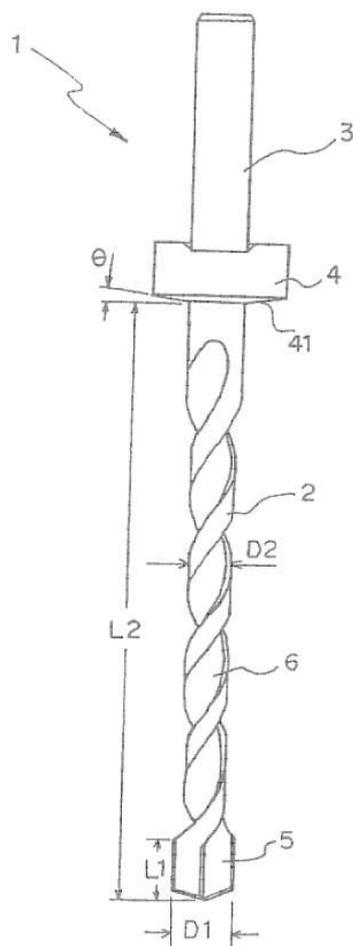
Anchoring-bolts for roof, floor [N: in galleries or longwall

working], or shaft-lining protection ([N: ground anchors [E02D 5/80](#); anchorings for building constructions [E04B 1/41](#), [E21D2/30](#)]; dowels or other devices fastened in walls or the like by inserting them in holes made therein for that purpose [F16B 13/00](#); [N: bolts with visible load [G01L 1/00](#)])

Definition statement

This subclass/group covers:

Anchoring bolts, also known as rock bolts or roof bolts, characterised by their construction or by additional elements forming part of them, such as washer or anchoring heads.



References relevant to classification in this group

This subclass/group does not cover:

Ground anchors E02D 5/80	E02D 5/08
Anchorings for building constructions	E04B 1/41
Dowels or other devices fastened in walls or the like by inserting them in	F16B 13/00

holes made therein for that purpose	
Bolts with visible load	G01L 1/00

Informative references

Attention is drawn to the following places, which may be of interest for search:

Lining anchored in the rock	E21D 11/006
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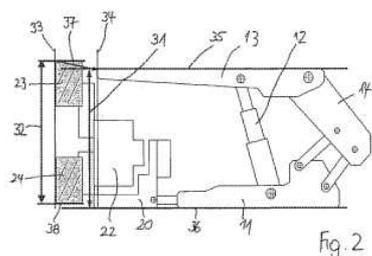
E21D 23/00

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 [E21F 13/008](#); shifting of mine conveyers at the working face [E21F 13/08](#))]

Definition statement

This subclass/group covers:

Longwall support, i.e. hydraulic jacks and frame for supporting the roof of the coal seam. A shearer cuts the coalface ahead of the support, and the support moves forward as the cutting progresses. The overburden collapses behind the support after passage of the same:



Informative references

Attention is drawn to the following places, which may be of interest for search:

Coal ploughs	E21C 27/34
Guiding a mining machine along a conveyer for cut mineral	E21C 35/12
Props	E21D 15/00

Transport of mine roof support units	E21F 13/008
Scraper chain conveyers	E21F 13/066
Shifting of mine conveyers at the working face	E21F 13/08
Details of hydraulic circuits	F15B