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Zero-gangue-discharge short-wall face pillar-free mining method

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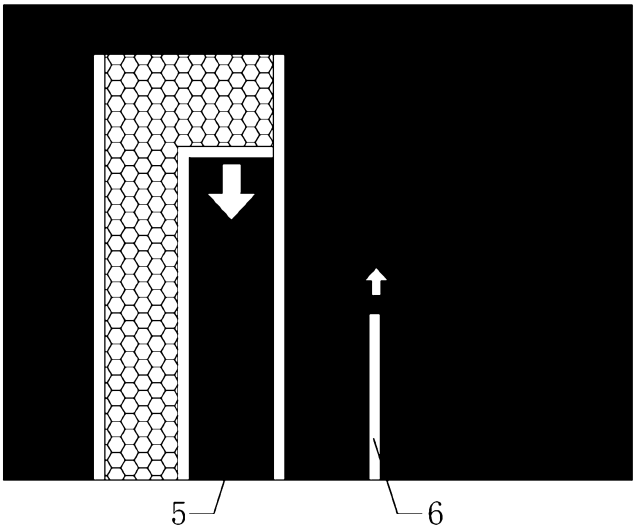
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Abstract

The present invention discloses a zero-gangue-discharge short-wall face pillar-free mining method, which is applicable to zero-gangue-discharge disposal in the mining operation in a mine shaft. A short-wall face is arranged in a selected area near a mine shaft according to the actual conditions of the mine shaft, the short-wall face is mined in a fully mining and fully back-filling mode, the gangues produced at other mining faces of the mine shaft are filled into the short-wall face, the short-wall face is supported with anchor rods along the edge of the filling face and the solid coal side to form an entry, and the entry is utilized to mine an adjacent working face. The method in the present invention mainly displaces the coal mass with gangues and thereby maximizes the utilization of the resources; in addition, the method can fully control the roof and realize mining without damage to the rock formation. Therefore, the method is of great value for wide application.

Drawing of Abstract



Description

Zero-Gangue-Discharge Short-Wall Face Pillar-Free Mining Method

Technical field

The present invention relates to a zero-gangue-discharge short-wall face pillar-free mining method, which is especially applicable to zero-gangue-discharge disposal in the mining operation in a mine shaft.

Background Art

Hundreds of million tons of gangues are produced in the coal mines in each year in China. However, at present, those gangues in the coal mines are mainly disposed by open stacking. Consequently, a great deal of land is occupied, and original landform and vegetation are buried under the gangues or damaged; in addition, spontaneous ignition may occur easily owing to open stacking, and may produce toxic substances that may cause severe harms to the living environment of human kind and the ecological environment in the mine field.

Many ways for gangue disposal have been worked out in China, but, in most of the ways, gangues are discharged first from coal mines before they are utilized. Consequently, though a part of the gangues are disposed, a great deal of dust is produced in the process of gangue discharge and disposal, resulting in secondary pollution to the environment. Presently, there is an urgent need for a coal mining method that can realize zero discharge of downhole gangue.

Contents of the Invention

Technical Problem: the purpose of the present invention is to overcome the drawbacks in the prior art, to provide a zero-gangue-discharge short-wall face pillar-free mining method, which is simple but can attain a good effect.

Technical Scheme: a zero-gangue-discharge short-wall face pillar-free mining method, comprising the following steps:

a. arranging a short-wall face in an area near the shaft station of a mine shaft according to the actual conditions of the mine shaft, the mining starting position of the short-wall face is 500m~1,000m away from the shaft station and the short-wall face is mined in a direction away from the shaft station;

b. transporting all gangues produced at other mining faces of the mine shaft to the short-wall face, mining the short-wall face in a fully mining and fully back-filling mode, and filling the short-wall face with the gangues; at the same time, supporting the roof and side walls of a roadway in the milling process with anchor rods, including supporting the roadway along the edge of a filling face and the solid coal side of the short-wall face; forming an entry at the outer side of the short-wall face after the supporting, and excavating a roadway at the outer side of a short-wall face adjacent to the current short-wall face at the same time;

c. excavating an open-off cut from the roadway to the current short-wall face after the roadway is excavated; utilizing the entry and the adjacent excavated roadway to form a backfill-mining working face at an adjacent short-wall face, continuing the mining in a fully mining and fully back-filling mode and filling the adjacent short-wall face with gangues; at the same time, transferring the excavating equipment to excavate adjacent roadway and open-off cut of a next short-wall face to prepare for the follow-up mining of the next short-wall face;

e. repeating the steps b and c and thereby realizing continuous mining of the short-wall face, with

the gangues disposed in the mine shaft, till all gangues produced in the downhole operation are disposed in the mine shaft; thus, zero gangue discharge on the ground surface is realized.

The short-wall face is used to dispose gangues underground, and the short-wall face is in 30~50m width, in height equal to the height of the coal seam, and in 1,000m~3,000m length. The entry is in 3~6m width. The short-wall face is mined in a mining sequence of alternating forward mining and backward mining, and the roadway is excavated always by forward excavation.

Beneficial effects: with the above-mentioned technical scheme, the method provided in the present invention has the following advantages over the prior art:

(1) All solid wastes such as all gangues or the like produced in the coal mining process are directly disposed underground by back-filling, and don't have to be discharged to the ground surface anymore. Therefore, a goal of zero gangue discharge is attained, environmental pollution resulted from gangue discharge is avoided, and the cost incurred by gangue disposal on the ground surface is greatly reduced as well.

(2) Small-size coal cutters and about 10 filing hydraulic supports are only required for short-wall face mining. Therefore, high production cost in the mine shaft is avoided, and the problems of low recovery efficiency and delay of normal production incurred by the current filling techniques are solved.

(3) Since an entry is reserved after the backfill mining of the short-wall face, the roadway excavation work is reduced, and the cost of roadway excavation is reduced.

(4) By displacing the coal mass with gangues and canceling pillars, the utilization of resources is maximized; in addition, by utilizing a fully mining and fully back-filling mode for the short-wall face, the roof can be controlled fully, and mining without damage to the rock formation is realized. Therefore, it is a method of a great value for wide application.

Description of Drawings

Fig. 1 shows forward mining of a short-wall face in the zero-gangue-discharge short-wall face pillar-free mining method according to the present invention;

Fig. 2 shows backward mining of the short-wall face in the zero-gangue-discharge short-wall face pillar-free mining method according to the present invention.

In the figures: 1 - short-wall face; 2 - entry; 3 - roadway; 4 - open-off cut; 5 - adjacent short-wall face; 6 - adjacent roadway.

Embodiments

Hereunder the present invention will be further detailed in an embodiment with reference to the accompanying drawings.

As shown in Figs. 1 and 2, the zero-gangue-discharge short-wall face pillar-free mining method according to the present invention comprises the following steps:

a. arranging a short-wall face 1 in an area near the shaft station of a mine shaft according to the actual conditions of the mine shaft, the short-wall face 1 is used to store gangues underground, and is in 30~50m width, in height equal to the height of the coal seam, and in 1,000m~3,000m length; the mining starting position of the short-wall face 1 is 500m~1,000m away from the shaft station, and the short-wall face 1 is mined in a direction away from the shaft station, in a mining sequence of alternating forward mining and backward mining; while excavating the short-wall face 1 always by forward excavation;

b. transporting all gangues produced at other mining faces of the mine shaft to the short-wall face 1, mining the short-wall face 1 in a fully mining and fully back-filling mode, and filling the short-wall

face 1 with the gangues; at the same time, supporting the roof and side walls of the roadway in the milling process with anchor rods, including supporting the roadway along the edge of a filling face and the solid coal side of the short-wall face 1; forming an entry 2 in 3~6m width at the outer side of the short-wall face 1 after the supporting, and excavating a roadway 3 at the outer side of a short-wall face 5 adjacent to the current short-wall face 1 at the same time;

c. excavating a open-off cut 4 from the roadway 3 to the current short-wall face 1 after the roadway 3 is excavated; utilizing the entry 2 and the adjacent excavated roadway 3 to form a backfill-mining working face at an adjacent short-wall face 5, continuing the mining in a fully mining and fully back-filling mode and filling the adjacent short-wall face 5 with gangues; at the same time, transferring the excavating equipment to excavate adjacent roadway 6 and open-off cut 4 of a next short-wall face to prepare for the follow-up mining of the next short-wall face;

e. repeating the steps b and c and thereby realizing continuous mining of the short-wall face 1, with the gangues disposed in the mine shaft, till all gangues produced in the downhole operation are disposed in the mine shaft; thus, zero downhole gangue discharge is realized.

Claims

1. A zero-gangue-discharge short-wall face pillar-free mining method, comprising the following steps:

a. arranging a short-wall face (1) in an area near a shaft station of a mine shaft according to actual conditions of the mine shaft, a mining starting position of the short-wall face is 500m~1,000m away from the shaft station, and the short-wall face (1) is mined in a direction away from the shaft station;

b. transporting all gangues produced at other mining faces of the mine shaft to the short-wall face (1), mining the short-wall face (1) in a fully mining and fully back-filling mode, and filling the short-wall face (1) with the gangues; at the same time, supporting a roof and side walls of a roadway (3) in the milling process with anchor rods, including supporting the roadway along an edge of a filling face and a solid coal side of the short-wall face (1); forming an entry (2) at an outer side of the short-wall face (1) after supporting, and excavating a roadway (3) at an outer side of a short-wall face (5) adjacent to the current short-wall face (1) at the same time;

c. excavating an open-off cut (4) from the roadway (3) to the current short-wall face (1) after the roadway (3) is excavated; utilizing the entry (2) and the adjacent excavated roadway (3) to form a backfill-mining working face at an adjacent short-wall face (5), continuing the mining in a fully mining and fully back-filling mode and filling the adjacent short-wall face (5) with gangues; at the same time, transferring excavating equipment to excavate adjacent roadway (6) and open-off cut (4) of a next short-wall face to prepare for the follow-up mining of the next short-wall face;

e. repeating the steps b and c and thereby realizing continuous mining of the short-wall face (1), with the gangues disposed in the mine shaft, till all gangues produced in the downhole operation are disposed in the mine shaft; thus, zero downhole gangue discharge is realized.

2. The zero-gangue-discharge short-wall face pillar-free mining method according to claim 1, wherein, the short-wall face (1) is used to dispose gangues underground, and the short-wall face (1) is in 30~50m width, in height equal to a height of the coal seam, and in 1,000m~3,000m length.

3. The zero-gangue-discharge short-wall face pillar-free mining method according to claim 1, wherein, the entry (2) is in 3~6m width.

4. The zero-gangue-discharge short-wall face pillar-free mining method according to claim 1, wherein, the short-wall face (1) is mined in a mining sequence of alternating forward mining and backward mining, and the roadway (3) is excavated always by forward excavation.

Drawings of Description

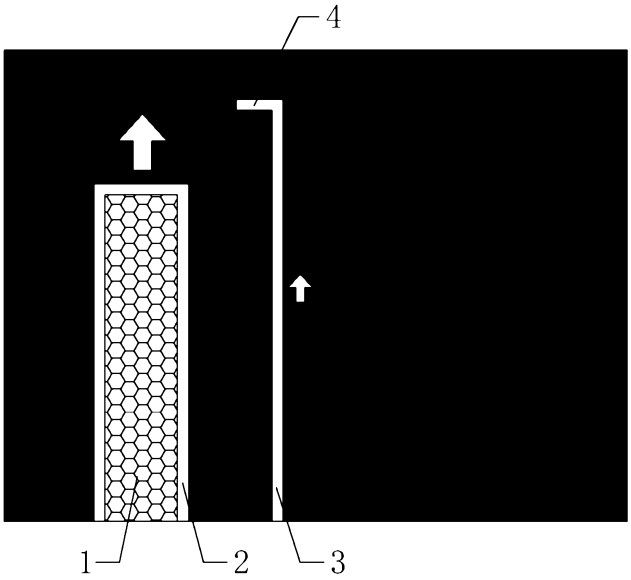


Fig. 1

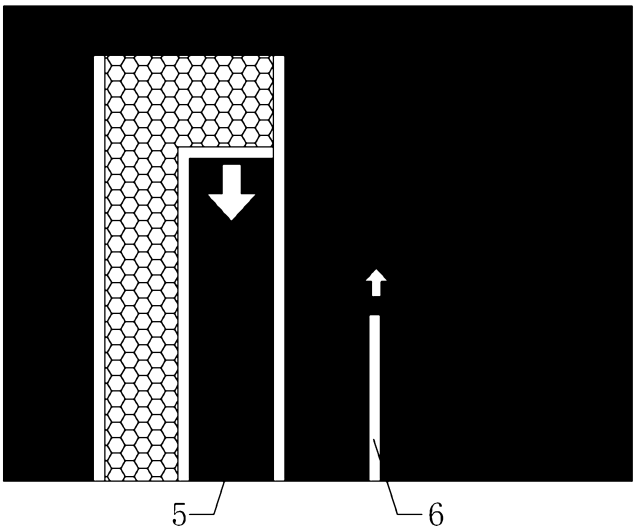


Fig. 2