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(54) **Safety device for open-pit mining**

Sicherheitseinrichtung für Tagebau

Dispositif de sécurité pour une mine à ciel ouvert

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Description

[0001] The present invention concerns a safety device for workers inside and outside an open-cut mining yard, for preventing dangerous ground release.

[0002] It is well known that an open-cut mining are often the cause of injuries due to the easy cave-in of the ground because of different reasons:

- the open-cut mining determines a quick evaporation of the ground around and causes a retirement of the soil with the following cracking that starts the land-sliding;
- the open-cut mining may reach and cut different layers of ground or more or less moist layers, with following instability;
- underground pipes may be present near the open-cut mining, determining further weakening of the ground's structure;
- further instability may be determined by vibrations of the traffic;
- the push load of the ground varies according to the variation of the ground itself;
- the load of the vehicles passing by gets summed to the natural push of the ground;
- the load of possible buildings nearby may weigh on the walls of the mining.

[0003] From the document GB352261 a system is known to realize timbering for trenches using a screw-jack interposed between said timbering to press the same against the walls of the trenches.

[0004] It is the aim of the present invention to realize an automatic hooking system of containing panels for open-cut mining yards.

[0005] The aim set forth is reached by means of the safety device according to the present invention, mainly consisting of:

- a couple of steel panels or panels of any other suitable material;
- a joint element between said panels, consisting of a central rafter, that may be automatically operated, and can be installed by means of hydraulic pliers connected to the arm of a crane or of a digger; the tensioning will be performed by the same pliers which have inside a hydraulic screwing and unscrewing mechanism. The widening of the rafter is performed mechanically through a conic couple that screws or unscrews the screw to one or two principles with a suitable capacity fixed onto the sliding element inside said rafter. A further mechanic unthreading with manual blocking allows to further widen the rafter for reaching greater mining widths, until a maximum extension of 4 meter width;
- a means for coupling between panels and rafter, consisting of a rubber buffer that allows the different components to bend one towards the other for mak-

ing said panels adhere always and in any case to the walls of the mining, even when the are not perfectly parallel to each other;

- a plurality of plugs for blocking the panels and the rafter that also allow to pre-load said rubber buffer during assembling so as to confer the wanted stiffness to the whole device even outside of the mining, during moving and installation;
- hydraulic pliers that may be installed onto each hydraulic crane for lorries or onto the arm of a digger. Once said pliers are inserted, the rafter gets blocked by means of two or three hydraulic screw-jacks. Inside the pliers body a reversible hydraulic motor allows to screw or unscrew the screw of the rafter coupled with a conical couple for automatically widening or tightening said rafter.

[0006] The present invention will be described more in detail hereinbelow relating to the enclosed drawings, in which an embodiment is shown.

Figure 1 shows a lateral scheme of a safety device for workers in open-cut mining yards, as installed.

Figures 2, 3, 4, 5, 6, 7, show the details of the device, and respectively:

- figure 2 shows a panel 1;
- figure 2 shows a rafter 4 with a double threading for an automatic installation;
- figure 3 shows a coupling for carrying accessories 6, that allows the insertion of a barrier carrying post directly onto said panel and forms the resting for a toe-clip board;
- figure 4 shows the barrier carrying post 7,
- figure 5 shows a support 8 for a blinking lamp 9.

Figure 6 shows an axonometric view of a complete device according to the present invention, as installed.

[0007] The enclosed figures show a safety device for workers in an open-cut mining yard, comprising:

- a couple of panels 1 connected by one single central rafter 4 that holds the push load of the ground and thus prevents the sliding thereof;
- an automatic rafter 4;
- self-centring hydraulic pliers to be connected to the arm of a crane or of a digger, for the automatic installation of said rafter 4;
- a reversible hydraulic motor inside the body of the pliers, for the automatic tensioning of said rafter 4,
- a accessory-carrying male/female joint 6 inserted onto said panel 1;
- a barrier carrying post 7;
- a barrier having also the function of a parapet;
- a support 8 for Dorman like lamps;

- accessories for assembling the markings, hooks, brackets etc.

[0008] In a possible variant, the device according to the present invention provides the presence of a rafter hinged with liquid nitrogen for the telescopic sliding of all components.

Claims

1. A safety device for workers inside and outside open-cut mining yards, for preventing dangerous soil releases, comprising:

- a couple of panels (1) connected by one single central rafter (4) that holds the push load of the ground and thus prevents the sliding thereon;
- an automatic rafter (4);
- self-centring hydraulic pliers to be connected to the arm of a crane or of a digger, for the automatic installation of the rafter (4);
- a reversible hydraulic motor inside the body of the pliers, for the automatic tensioning of the rafter (4),
- a accessory-carrying male/female joint (6) inserted onto said panel (1);
- a barrier carrying post (7);
- a support (8) for Dorman like lamps;
- accessories for assembling markings;

characterized in that the automatically operated rafter (4) is installed by means of hydraulic pliers connected to the arm of a crane or of a digger, and the tensioning will be performed by the same pliers which have inside a hydraulic screwing and unscrewing mechanism and the widening of the rafter (4) is performed mechanically through a conic couple that screws or unscrews the screw to one or two principles with a suitable capacity fixed onto the sliding element inside said rafter.

2. A device according to claim 1, *characterized in that* said means for coupling between panels (1) and rafter (4) consists of a rubber buffer that allows the different components to bend one towards the other for making said panels adhere always and in any case to the walls of the mining, even when the are not perfectly parallel to each other.

3. A device according to claim 1, *characterized in the* presence, for the automatic installation, of hydraulic pliers that may be installed onto each hydraulic crane for lorries or onto the arm of a digger; once said pliers are inserted, the rafter gets blocked by means of two or three hydraulic screw-jacks, while inside the pliers body a reversible hydraulic motor allows to screw or unscrew the screw of the rafter coupled with a conical

couple for automatically widening or tightening said rafter.

5 Patentansprüche

1. Eine Sicherheitsvorrichtung für Arbeiter im Innen- Und Außenbereich von offenen Baustellengruben zur Vermeidung gefährlichen Nachgebens des Bodens, die das Folgende umfasst:

- ein Paar Paneele (1), die mit einem einzigen zentralen Sparren (4) verbunden sind, der die Drucklast des Bodens trägt und daher sein Rutschen verhindert;
- einen automatischen Sparren (4);
- einen selbstzentrierenden, hydraulischen Greifer, der mit dem Arm eines Krans oder eines Baggers zu verbinden ist, für die automatische Installation des Sparrens (4);
- einen reversiblen Hydraulikmotor im Gehäuse des Greifers für das automatische Spannen des Sparrens (4);
- eine Zubehörtrageverbindung SteckerBuchse (6) auf dem Paneel (1) eigesetzt;
- einen sperrentragenden Pfosten (7);
- eine Stütze (8) für Lampen vom typ Dorman;
- Zubehörteile für den Zusammenbau von Schildern;

dadurch gekennzeichnet, dass der automatisch betätigte Sparren (4) mittels eines hydraulischen Greifers installiert wird, der mit dem Arm eines Krans oder eines Baggers verbunden ist und das Spannen erfolgt mittels desselben Greifers, der innen über einen hydraulischen Schraub- und Losschraubmechanismus verfügt und die Ausdehnung des Sparrens (4) erfolgt mechanisch mittels eines konischen Paares, das die Schraube einen oder zwei Gänge mit passender Leistung fest- oder losschraubt, befestigt auf dem Gleitelement innerhalb des genannten Sparrens.

2. Vorrichtung gemäß Anspruch 1, *dadurch gekennzeichnet, dass* das genannte Mittel zur Verbindung zwischen Paneelen (1) und Sparren (4) aus einem Gummipuffer besteht, der es den verschiedenen Komponenten gestattet, sich einander zuzubeugen, damit die genannten Paneele in jedem Fall immer an den Wänden der Grube anliegen, auch wenn sie nicht perfekt parallel zueinander sind.

3. Vorrichtung gemäß Anspruch 1, *dadurch gekennzeichnet, dass* für die automatische Installation ein hydraulischer Greifer vorhanden ist, der auf jedem Hydraulikkran für Lastwagen oder dem Arm eines Baggers installiert werden kann; sobald der genannte Greifer eingesetzt wurde, wird der Sparren mittels

zwei oder drei Hydraulischen Hebevorrichtungen blockiert, während ein reversibler Hydraulikmotor innerhalb des Gehäuses des Greifers das Fest- oder Losschrauben der Schraube des Sparrens verbunden mit einem konischen Paar zum automatischen Ausdehnen oder Zusammenziehen des genannten Sparrens gestattet.

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d'une excavatrice; lorsque dites pinces sont montées, le chevron est immobilisé par deux ou trois crics à vis, tandis qu'à l'intérieur du corps des pinces un moteur hydraulique réversible permet de visser ou dévisser la vis du chevron accouplé sur un couple conique permettant d'élargir ou rétrécir automatiquement dit chevron.

Revendications

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1. Un dispositif de sécurité pour les ouvriers travaillant à l'intérieur et à l'extérieur des exploitations à ciel ouvert, permettant d'éviter de dangereux affaissements du sol, comprenant:

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- deux panneaux (1) assemblés par un seul chevron (4) supportant la charge de poussée du sol et empêchant donc les glissements;
 - un chevron automatique (4);
 - des pinces hydrauliques à centrage automatique à raccorder sur le bras d'une grue ou d'une excavatrice, pour l'installation automatique du chevron (4);
 - un moteur hydraulique réversible à l'intérieur du corps des pinces, pour le tensionnement automatique du chevron (4);
 - un joint (6) mâle/femelle porte accessoire fixé sur dit panneau (1);
 - un poteau porte barrière (7);
 - un support (8) pour lamper de type Dorman;
 - des accessoires d'assemblage et marquage;
- caractérisé par le fait que** le chevron actionné automatiquement (4) est installé à l'aide de pinces hydrauliques fixées sur le bras d'une grue ou d'une excavatrice et que le tensionnement est assuré par ces mêmes pinces qui contiennent un mécanisme hydraulique de visage et dévisage et que l'élargissement du chevron (4) est assuré mécaniquement par un accouplement conique qui visse et dévisse la vis sur un ou deux principes avec une capacité adéquate fixés sur l'élément coulissant à l'intérieur du dit chevron.

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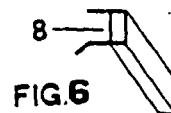
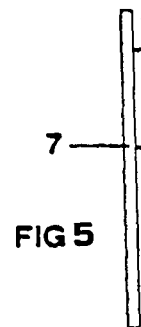
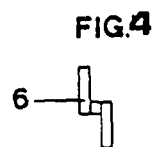
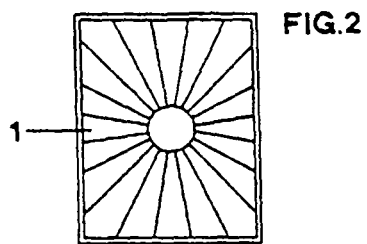
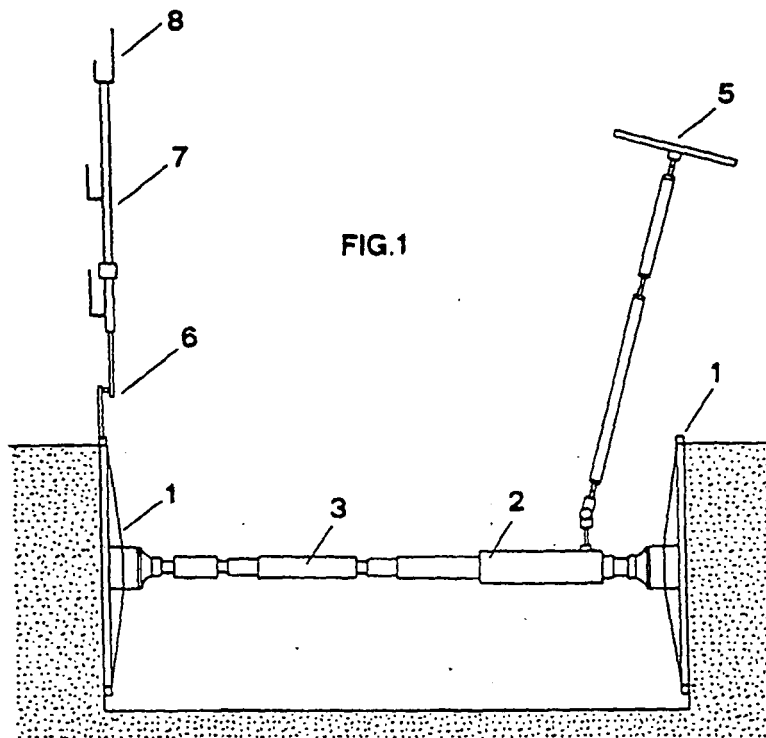
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2. Un dispositif selon la revendication 1, **caractérisé par le fait que** dit moyen d'accouplement entre les panneaux (1) et le chevron (4) consistent en un tampon en caoutchouc permettant aux différents composants de s'unir entre eux afin de faire toujours et dans tous les cas adhérer solidement les panneaux aux parois des excavations du chantier, même si elles ne sont pas parfaitement parallèles entre elles.

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3. Un dispositif selon la revendication 1, **caractérisé par** la présence, sur l'installation automatique, de pinces hydrauliques pouvant être installées sur chaque grue hydraulique des camions ou sur le bras

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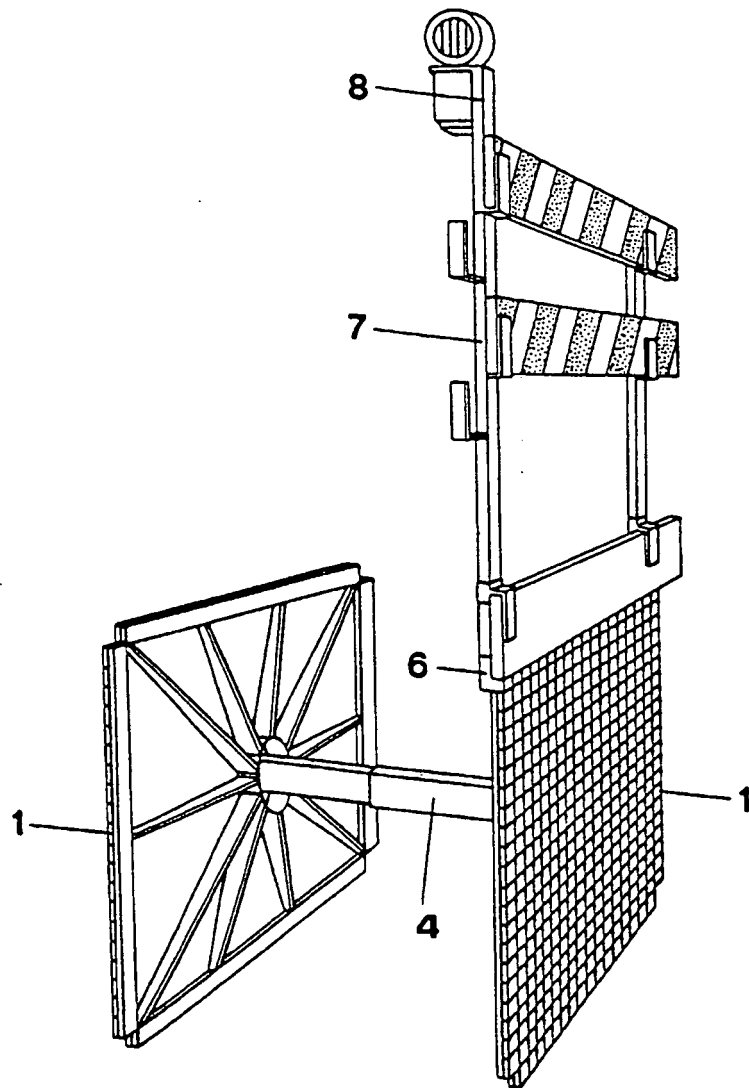


FIG. 7

REFERENCES CITED IN THE DESCRIPTION

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