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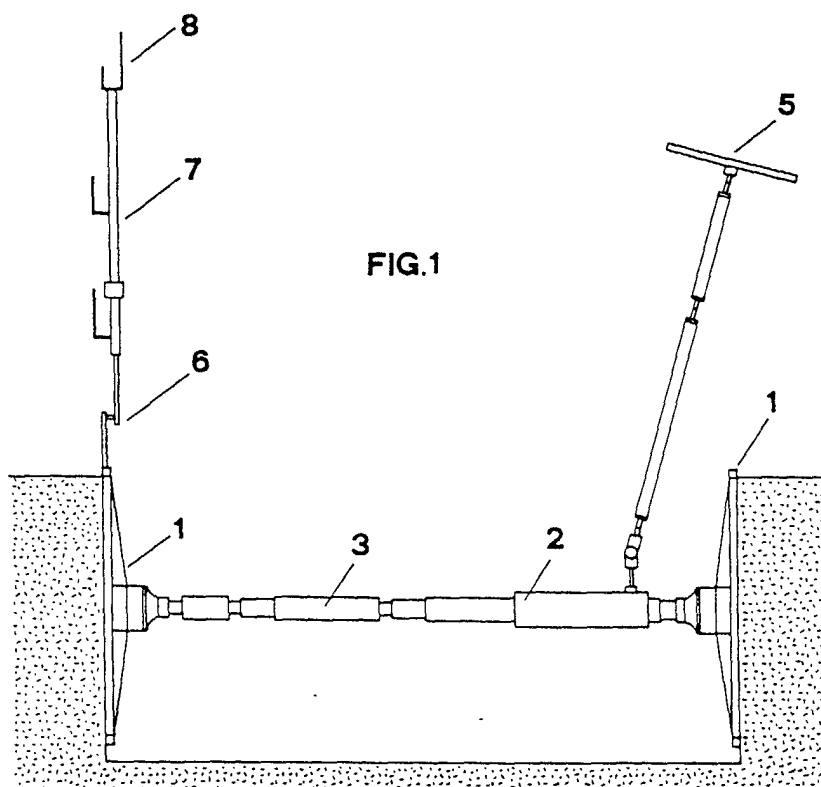
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(54) **Safety device for open-pit mining**

(57) A safety device for workers inside and outside open-cut mining yards, for preventing dangerous sliding of the soil, comprising:

- a panel (1);
- a rafter (2) for manual push, with an extension (3) of different lengths according to the width of the mining to be reinforced;

- a rafter (4) with a double threading for an automatic installation;
- a telescopic key (5);
- 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;
- a barrier carrying post (7);
- a support (8) for a blinking lamp (9).



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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] It is the aim of the present invention to completely solve the serious problems described above which may be the cause of frequent and sometimes tragic industrial injuries for the workers.

[0004] 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 or manually operated, differing one from the other only in the way of hooking for the installation and in the tensioning system inside said mining.
- In particular, the manually operated rafter - that may be installed with any means suitable for hoisting, by means of hooks placed at the ends and suitable Y branches - has, for the tensioning of the device on the walls of the mining, a suitable manual telescopic key that allows the worker to operate remaining safely outside the mining. The automatic rafter, on the other hand, 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 that has 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 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;
- 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;
- a manual telescopic key for tensioning the device inside the mining;
- for the automatic 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.

[0005] 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, 8 and 9 show the details of the device, and respectively:

- figure 2 shows a panel 1;
- figure 3 shows a rafter 2 for manual push, and in figure 4 an extension 3 of different lengths is shown according to the width of the mining to be reinforced;
- figure 5 shows a rafter 4 with a double threading for an automatic installation;
- figure 6 shows a telescopic key 5;
- figure 7 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 8 shows the barrier carrying post 7,
- figure 9 shows a support 8 for a blinking lamp 9.

Figure 10 shows an axonometric view of a complete device according to the present invention, as installed.

[0006] 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 2 or 4 that holds the push load of the ground and thus prevents the sliding thereof;
- a manual rafter 2 or an automatic rafter 4;
- a manual telescopic key 5, for the manual tensioning of said rafter;
- 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.

[0007] 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,
characterized in:

- a couple of panels (1) connected by one single central rafter (2, 4) that holds the push load of the ground and thus prevents the sliding thereof;
- a manual rafter (2) or an automatic rafter (4);
- a manual telescopic key (5), for the manual tensioning of said rafter (2);
- 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 barrier having also the function of a parapet;
- a support (8) for Dorman like lamps;
- accessories for assembling the markings, hooks, brackets etc.

2. A device according to claim 1, **characterized in that** the manually operated rafter (2) - that may be installed with any means suitable for hoisting, by means of hooks placed at the ends and suitable branches - has, for the tensioning of the device on

the walls of the mining, a suitable manual telescopic key (5) that allows the worker to operate remaining safely outside the mining.

3. A device according to claim 1, **characterized in that** the automatically operated rafter (4) can be 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 that has 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.

4. A device according to claim 1, **characterized in that** said means for coupling between panels (1) and rafter (2, 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.

5. 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.

6. A device according to claim 1, **characterized in the** presence of a rafter hinged with liquid nitrogen for the telescopic sliding of its components.

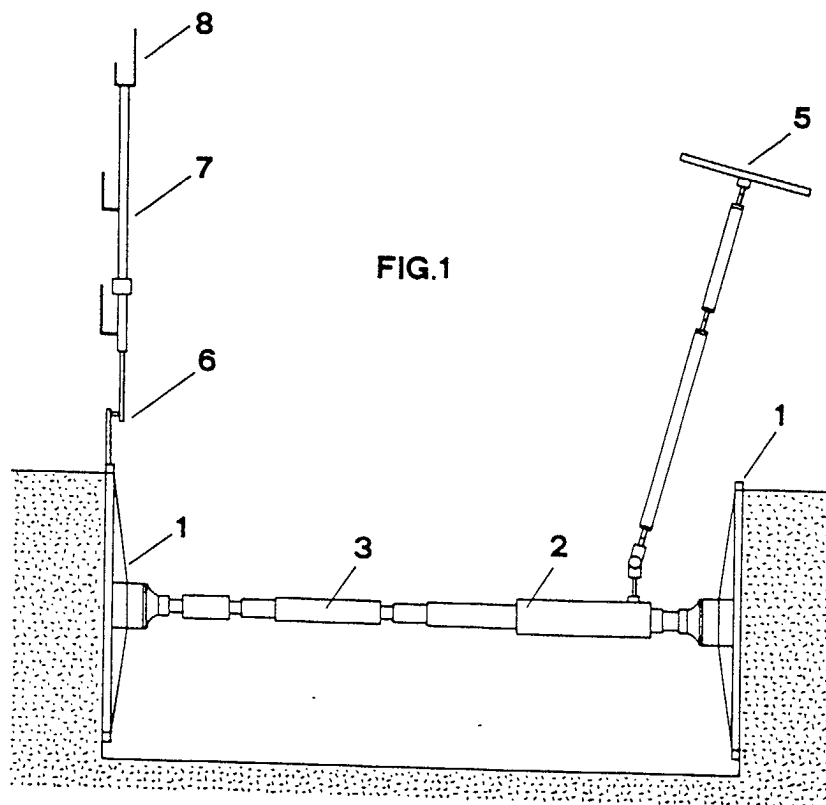


FIG. 1

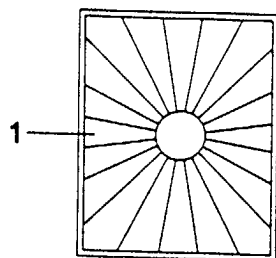


FIG. 2

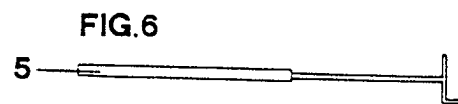


FIG. 6

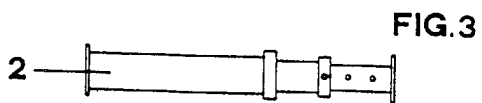


FIG. 3

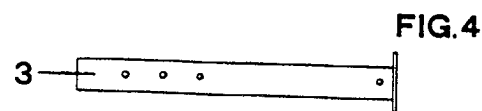


FIG. 4

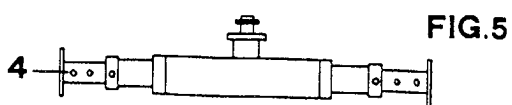


FIG. 5

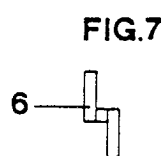


FIG. 7

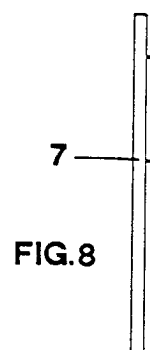


FIG. 8

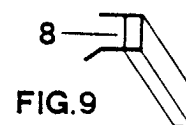


FIG. 9

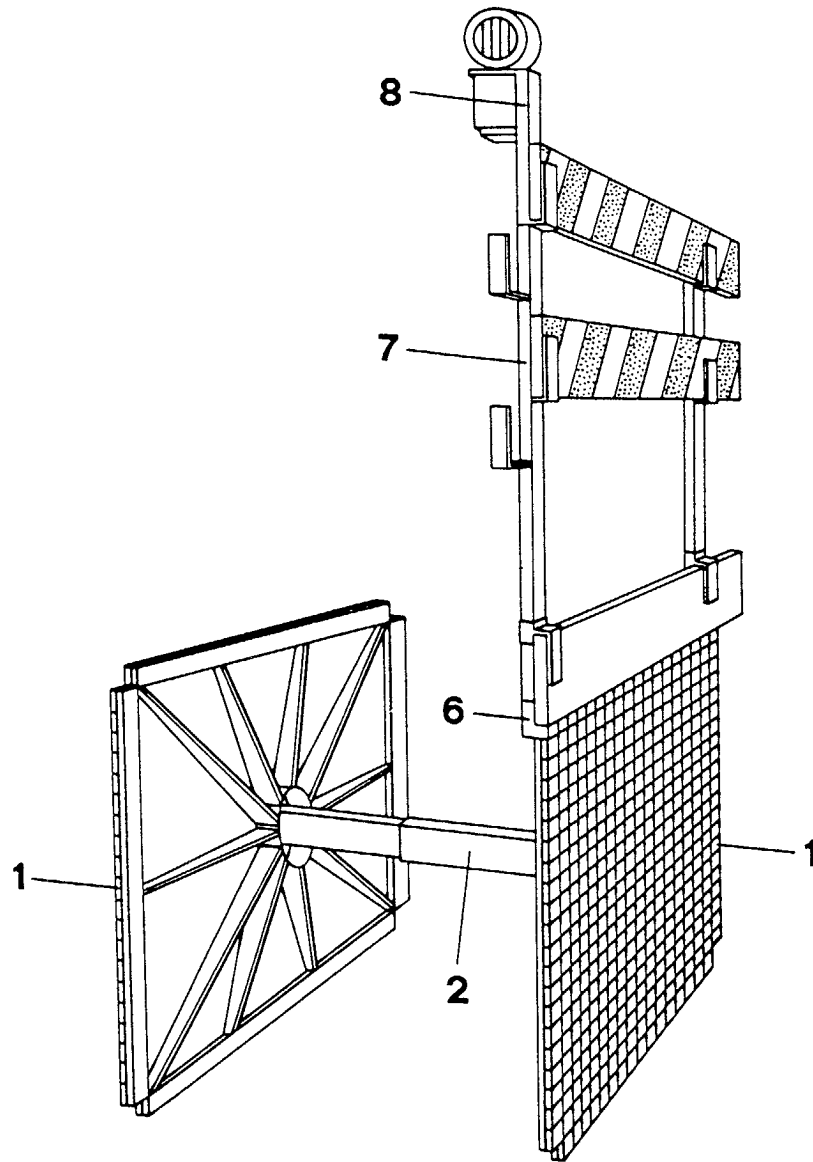


FIG.10



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EUROPEAN SEARCH REPORT

Application Number
EP 02 07 8958

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The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 4 September 2003	Examiner van Berlo, A
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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