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FULL NAMES OF APPLICANT

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EARLIEST PRIORITY CLAIMED

COUNTRY	NUMBER	DATE
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TITLE OF INVENTION

54	METHOD AND DEVICE FOR IMPACT LOOSENING OF THREAD JOINT

57	ABSTRACT (NOT MORE THAT 150 WORDS)	NUMBER OF SHEETS	9

If no classification is finished, Form P.9 should accompany this form.
The figure of the drawing to which the abstract refers is attached.

Detection of impact loosening of thread joints

The present invention relates to a method and a device for detection of impact loosening of thread joints at rock drilling.

When drilling long holes in a ground, for example rock, several rods are used which are screwed together in order to lengthen the drill string as needed during the drilling. The tightening of the threads normally becomes so firm as a consequence of the shock waves passing the thread joints during drilling that one cannot loosen the thread joints only with the assistance of the rotation motor of the rock drilling machine. In order to solve this problem the operator ends the drilling through letting the impact device exert the drill string to impacts for a short while without pressing the drill string against the ground. The operator stops the impact device when a characteristic change of the sound is heard. After that the drill string can be unscrewed with the rotation motor of the rock drilling machine and the separate drill rods can be picked up one by one. A drawback with this method is that one cannot automate the taking up of the drill string when drilling has occurred automatically. Another drawback is that the operator has difficulties in hearing that the impact loosening has occurred at an early stage because of the noisy environment. This gives rise to unnecessary wear on the drilling equipment.

The present invention, which is defined in the subsequent claims, aims at achieving a detection of impact loosening of thread joints to make possible automatic drilling of a drill hole including automatic taking up of the drill string after the drilling itself so that one thereafter can position the drilling device for the drilling of a new hole. Another purpose with the invention is to avoid unnecessary loads on the drilling through early detection of the impact loosening of the thread joints. This is addressed mainly through sensing the vibrations emitted by the drilling equipment when the rock drilling machine is impacting the drill string without feeding the drill string against the ground. The sensing can be achieved through using either a microphone or a vibration sensor for other frequencies. The sensed vibrations are compared with known vibration patterns characteristic for the impact loosening in an analysis tool. These vibration patterns can be either a characteristic change of the vibrations from the drilling equipment or that the vibrations after the impact

loosening get a characteristic shape. When the analysis tool has detected that the impact loosening has taken place a signal is sent to the control system of the drill rig which shuts off the impact device after which the drill string is taken up rod by rod automatically.

An embodiment of the invention is described below with reference to the accompanying drawing which schematically shows a rock drilling equipment in which the invention is incorporated.

The rock drilling equipment shown in the drawing comprises a carrier 11 provided with a boom 12 on which a feed beam 6 is arranged. A rock drilling machine 2 is movable to-and-fro along the feed beam. The rock drilling machine 2 comrises an impact device intended for exerting a drill string 1 to impacts and a rotation device in the usual way. The drill string 1 may comprise an arbitrary number of drill rods which are connected with each other by means of thread joints. A microphone or other vibration sensing device 7 is arranged on the feed beam 6 or at another suitable position. The device 7 is connected to an analysis tool 4 which suitably comprises a filter to separate interesting frequencies for frequency analysis and to decrease the amount of data to be handled. The analysis tool 4 can be arranged to work either digitally or analogically. In the analysis tool 4 the sensed vibrations are compared with known vibration patterns, which may either be a typical change of the character of the vibration or discovery of a vibration pattern which is typical for the impact loosened thread joint. When the impact loosening is detected a signal is sent to the control system 5 of the drilling equipment which then turns off the impact device. After that the drill string 1 can be picked up automatically and placed in the rod magazine 13 rod by rod.

The driling equipment shown in the drawing is intended for use at the surface. The invention can equally well be used at long hole drilling underground, e.g. in connection with grouting.

Claims:

1. Method of impact loosening of thread joints at rock drilling, **characterized in that** vibrations from a drill string are sensed at the same time as a rock drilling machine exerts the drill string to impacts without feeding the drill string against a ground, that the sensed vibrations are supplied to an analysis tool, that the sensed vibrations are compared with known vibration patterns by the analysis tool and that a signal is sent to a control system for controlling the rock drilling machine for stopping the impact device of the rock drilling machine when the analysis tool has detected that the sensed vibrations correspond to the known vibration pattern which marks that the thread joints have been loosened by impact.

2. Device for detecting impact loosening of thread joints at rock drilling comprising a rock drilling machine movable along a feed beam for exerting a drill string to impacts, **characterized by** a device for sensing of vibrations from the drill string when applying the method of claim 1, an analysis tool for comparing the sensed vibrations with known vibration patterns, the analysis tool being arranged to send a signal when the sensed vibrations correspond to the known vibration pattern which marks that the thread joints have been impact loosened, and a control system for controlling the rock drilling machine, whereby the control system is arranged to turn off the impact device of the rock drilling machine as a result of the signal sent by the analysis tool.

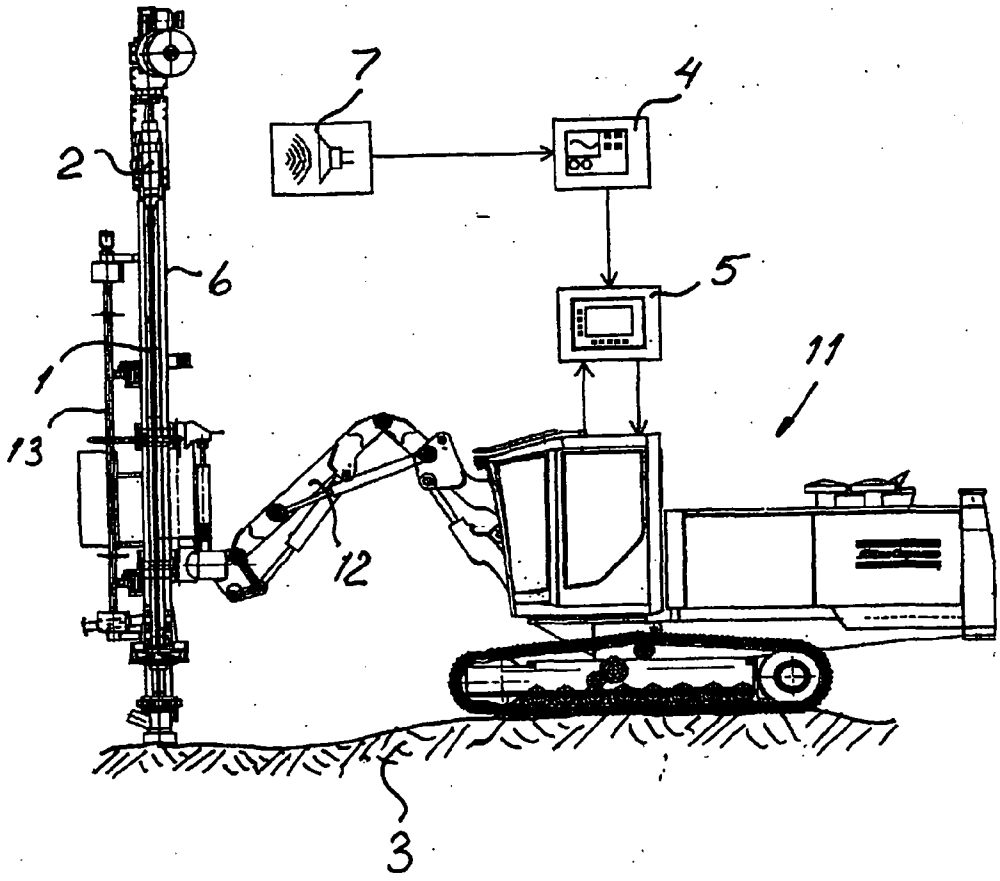
3. Device according to claim 2 where the control system is arranged to turn off the impact device of the rock drilling machine when the analysis tool sends the signal.

4. Device according to claim 2 or 3 where the device for sensing of vibrations is a microphone.

5. Device according to any of claims 2 to 4 where the device for sensing of vibrations is located in the vicinity of the drilling machine.

6. Device according to any of claims 2 to 5 where the device for sensing of vibrations is arranged on the feed beam.

7. Rock drilling equipment comprising a carrier provided with a boom on which a feed beam is arranged, **characterized in that** it further comprises a device according to any of claims 2 to 6.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