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MINE ROOF BOLT INSTALLATION

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FIG. 1.

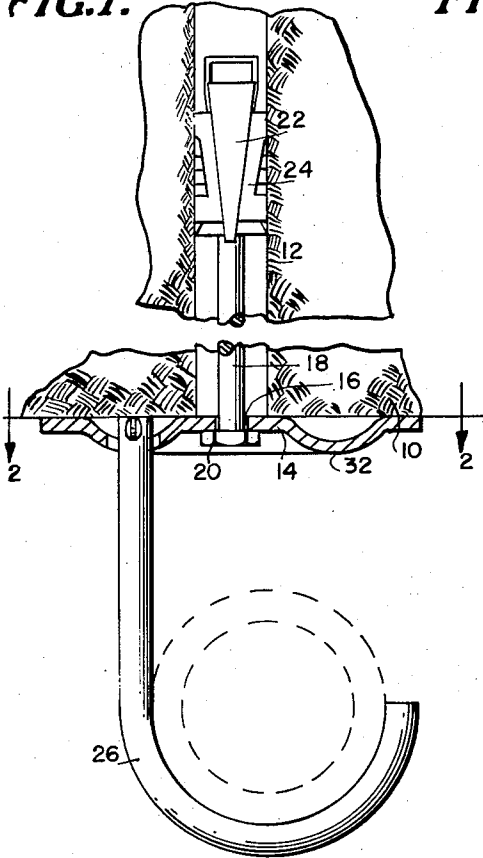


FIG. 2.

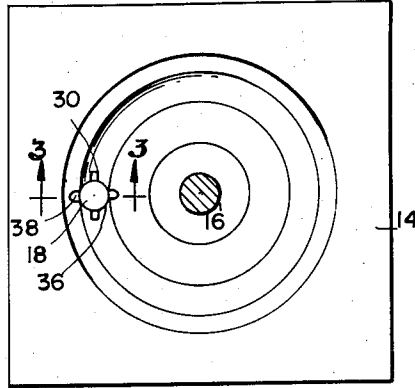


FIG. 3.

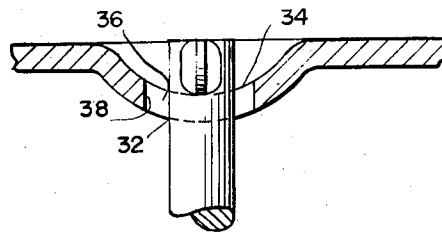
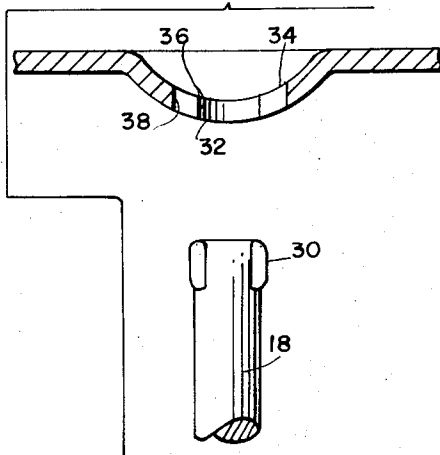


FIG. 4.



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MINE ROOF BOLT INSTALLATION

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5 Claims. (Cl. 61—45)

The present invention relates to mine roof bolt installations and more particularly to a mine roof bolt installation having a hanger embodied therein for suspending conduit and the like from the mine roof.

The use of mine roof bolts of the type including an expansible anchoring shell are well known, as exemplified by my prior patent, No. 2,753,750, issued July 10, 1956. Such bolts serve to prevent collapse of the mine roof by tensioning plate-like washers into engagement with the surface of the roof. During normal operations within the mine, it frequently becomes necessary to handle conduit, such as electrical lines, hydraulic lines, air and water hose, and the like. It is often necessary in handling such conduit, to maintain the same off of the mine floor so that they will not hamper the operations being carried out thereon. The present invention contemplates a mine roof bolt installation embodying a hanger which may be conveniently utilized to support conduit above the mine floor.

Accordingly, it is an object of the present invention to provide a mine roof bolt installation embodying a conduit hanger of the type described.

Still another object of the present invention is the provision of a mine roof bolt installation embodying a conduit hanger having improved means for detachably securing the hanger to the washer of the installation.

Still another object of the present invention is the provision of a mine roof bolt installation including a washer having a rib formed thereon operable to serve both as a strengthening means for the washer and to provide clearance space to receive and support a conduit hanger from the washer.

Still another object of the present invention is the provision of a mine roof bolt installation including a conduit hanger which is simple in construction, easy to assemble and disassemble and economical to manufacture.

These and other objects of the present invention will become more apparent during the course of the following detailed description and appended claims.

The invention may best be understood with reference to the accompanying drawings wherein an illustrative embodiment is shown.

In the drawings:

Figure 1 is a fragmentary vertical sectional view through a drilled hole in a mine roof showing a mine roof bolt installation embodying the principles of the present invention in operative position therein;

Figure 2 is a cross-sectional view taken along the line 2—2 of Figure 1;

Figure 3 is an enlarged fragmentary cross-sectional view taken along the line 3—3 of Figure 2; and

Figure 4 is a view similar to Figure 3 illustrating the manner in which the hanger is removed from the washer.

Referring now more particularly to Figure 1 of the drawings, there is shown a mine roof 10 provided with a drilled vertical hole 12 having a mine roof bolt installation embodying the principles of the present invention positioned therein. The installation includes a plate-like

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washer 14 centrally apertured, as at 16, to receive an elongated bolt 18. The lower end of the bolt has a head member 20 formed thereon which engages the washer and the upper end thereof is threaded to receive a wedge member 22. An expansible anchoring shell assembly 24 is engaged with the wedge member so as to be expanded into the wall of the hole to thereby permit tensioning of the bolt between the anchoring shell assembly engaged wedge member and the washer engaged head member by turning of the latter.

The anchoring shell assembly and cooperating wedge member may be of any suitable construction and the embodiment shown is constructed in accordance with the teachings set forth in my patent mentioned above. As disclosed in the patent, the wedge member may be made integral with the bolt and the head member threaded thereon, if desired. The specific construction of the anchoring shell assembly and the manner in which the anchoring shell assembly is expanded into the wall of the hole 12 is fully disclosed in the patent, to which reference may be had, if necessary.

The present invention is more particularly concerned with the provision of a means in an installation of the type described for supporting conduit above the mine floor. To this end, there is provided a conduit hanger 26, which is preferably constructed of a rod of metal or the like having its lower end bent into a hook-shaped configuration for receiving and supporting conduit and its upper end transversely elongated to provide a pair of diametrically opposed ears 30.

The washer 14 is formed with an elongated rib 32 extending downwardly from its lower surface, which preferably is of circular configuration concentric with the central aperture 16. The rib 32 serves to strengthen the washer and provides a recess 34 in the upper surface of the washer within which the transversely elongated end of the hanger is arranged to be received and supported. Extending vertically through the rib 32 is an opening 36 which is transversely elongated, as by opposed notches 38, in a direction transverse to the extent of the rib adjacent thereto.

As best shown in Figures 3 and 4, the hanger is engaged within and supported by the washer in the following manner. Assuming that the washer 14 has been properly engaged with the mine roof by the operation of the bolt 18 and anchoring shell assembly, the ears 30 of the hanger 26 are aligned with the notches 38 of the opening 36 (Figure 4) and the hanger end is moved upwardly through the opening. When the ears 30 pass through the notches 38, the hanger is turned approximately 90° and the ears are allowed to rest on the rib adjacent the opening 36 (Figure 3). The hanger is removed by reversing the above procedure.

It will be noted that the recess 34 is concavely arcuate in cross-section so that the ears 30 naturally tend to seat within the lowermost portion of the recess, so that they are approximately at right angles to the extent of the notches. The position of engagement of the ears within the recess is below the upper edges of the notches and, therefore, a load on the hanger tends to prevent turning of the hanger into a position of notch alignment, which would permit the hanger to drop. Thus, the greater the load carried by the hanger, the lesser the likelihood of the same becoming separated by a turning action.

It can thus be seen that there has been provided a mine roof bolt installation including a conduit hanger which may be readily secured in operative position and removed therefrom. The hanger is of simple construction, being readily fabricated from rod stock by conventional operations. The hanger-receiving opening in the washer can be easily formed in the same operation as the central

aperture. It will be understood that the invention is not limited to the notched opening and deformed ear arrangement shown, but that other constructions may be utilized. For example, the hanger end could be simply deformed transversely by a press or the like and the opening suitably elongated to receive it.

The provision of the rib in the washer is significant in that it performs two distinct functions. First, it serves to strengthen the washer and, second, it provides a recess space within which the hanger end may be received and supported without interference from the mine roof.

It thus will be seen that the objects of this invention have been fully and effectively accomplished. It will be realized, however, that the foregoing specific embodiment has been shown and described only for the purpose of illustrating the principles of this invention and is subject to extensive change without departure from such principles. Therefore, this invention includes all modifications encompassed within the spirit and scope of the following claims.

I claim:

1. A mine roof bolt assembly comprising: an elongated bolt having an expansible anchoring means on one end thereof insertable in an upwardly extending hole in a mine roof, anchoring means end foremost; a plate having a roof engaging surface and a central aperture therein for receiving said bolt; head means on the other end of said bolt operatively engageable with the opposite surface of said plate adjacent said aperture, during use, to retain the roof engaging surface of said plate in engagement with the mine roof to support the same with the bolt tensioned between said anchoring means and said head means; elongated reinforcing rib means formed in said plate throughout a substantial portion thereof in substantially symmetrical arrangement about said bolt receiving aperture for strengthening said plate, said elongated rib means defining elongated recess means of arcuately concave transverse cross-sectional configuration in the roof engaging surface of said plate, said elongated rib means having an opening extending therethrough in spaced relation to said bolt receiving aperture, said opening being elongated in a direction transverse to the longitudinal extent of the portion of said elongated rib means adjacent said opening; and a hanger having one end transversely elongated for insertion upwardly through said opening in transverse registry therewith and for seating within and supported by the bottom of the portion of said elongated recess means adjacent said opening upon rotation into a position of general alignment with said elongated rib means, the relative depth of said elongated recess means adjacent said opening and height of the transversely elongated end of said hanger being such that the latter is insertable upwardly through said opening and rotatable into supported relation with the bottom of the portion of said elongated recess means adjacent said opening while said plate is in supporting engagement with the mine roof, said hanger having an opposite end portion formed into a generally hook-shaped configuration for receiving and supporting a conduit or the like, during use.

2. A mine roof bolt assembly as defined in claim 1 wherein said elongated rib means is circular and is disposed in concentric relation with respect to said bolt receiving aperture.

3. A mine roof bolt assembly as defined in claim 1 wherein said opening is disposed wholly within said elongated rib means and includes a circular hole having diametrically opposed notches extending radially therefrom.

4. A mine roof bolt assembly as defined in claim 3 wherein said hanger comprises a rod of circular cross-section having diametrically opposed ears formed in one end to define the transverse elongation thereof, said one end terminating at a vertical position substantially aligned with the roof engaging surface of said plate when supported by the bottom of the portion of said elongated recess means adjacent said opening.

5. A mine roof bolt assembly comprising: an elongated bolt having expansible anchoring means on one end thereof insertable in an upwardly extending hole in a mine roof, anchoring means end foremost; a plate having a roof engaging surface and a central aperture therein for receiving said bolt; head means on the other end of said bolt operatively engageable with the opposite surface of said plate adjacent said aperture, during use, to retain the roof engaging surface of said plate in engagement with the mine roof to support the same with the bolt tensioned between said anchoring means and said head means; and elongated reinforcing rib means formed in said plate throughout a substantial portion thereof in substantially symmetrical arrangement about said bolt receiving aperture for strengthening said plate, said elongated rib means defining elongated recess means of arcuately concave transverse cross-sectional configuration in the roof engaging surface of said plate, said elongated rib means having an opening extending therethrough in spaced relation to said bolt receiving aperture, said opening being elongated in a direction transverse to the longitudinal extent of the portion of said elongated rib means adjacent said opening for receiving a transversely elongated end of a conduit hanger so that the latter can be inserted upwardly therethrough while said plate is in supporting engagement with the mine roof and rotated into supported relation with the bottom of the portion of said elongated recess means adjacent said opening.

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