United States Patent

[11] 3,601,994

[72] Inventor **Alex J. Galis**
Box 480, Rte 3, Albany, Ga. 31702

[21] Appl. No. **849,963**
[22] Filed **Aug. 14, 1969**
[45] Patented **Aug. 31, 1971**

[54] **METHOD AND APPARATUS FOR MINE ROOF SUPPORT**
4 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** ..... **61/45 R,** 85/3, 85/63
[51] **Int. Cl.** **E21d 21/00**
[50] **Field of Search** ..... 61/45 B, 45 R; 52/166, 223 L; 24/136 K, 126 K, 132, 132 HA, 132 HL, 132 PT, 132 CH, 134, 134 K; 85/3, 79; 287/75, 83

[56] **References Cited**

UNITED STATES PATENTS

179,160	6/1876	Chase	24/126 UX
809,374	1/1906	Holden	52/166 X
1,857,437	5/1932	Cole	24/126 X
2,192,554	3/1940	Moisseeff-Muspratt	61/45
2,471,503	5/1949	Ward et al.	24/134
2,970,444	2/1961	Peter	61/45 B
3,009,224	11/1961	Alexander	287/75 X
3,163,012	12/1964	Dempsey	61/45 B
3,338,128	8/1967	Taylor	85/79
3,427,811	2/1969	White	61/45

FOREIGN PATENTS

271,284	8/1964	Australia	61/45 B
943,667	12/1963	Great Britain	61/45 B
694,725	9/1930	France	24/126 K
1,143,471	2/1963	Germany	61/45 B
407,014	8/1966	Switzerland	61/45 B

Primary Examiner—Dennis L. Taylor
Attorney—Stanley J. Price, Jr.

ABSTRACT: A roof support for underground mines having angular support holes drilled in the roof adjacent the pillar walls. One end of a flexible cable reeved about a wedge member is inserted in one of the support holes and the end of the cable is wedged against the side walls of the support hole. The other end of the cable is inserted in the other support hole on the opposite side of the passageway with the cable end portion reeved about a wedge member. The wedge member with the cable end portion is urged upwardly into the other support hole until the cable stretches a preselected amount. The wedge member is then released and wedges the cable end portion against the walls of the other support hole to provide a cable under tension extending between the angularly positioned support holes and supporting the roof therebetween. Where desired, elongated support members may be positioned between pairs of tensioned cables and the roof to provide additional support. Another embodiment includes inserting separate strands of flexible cable in both support holes, connecting the free ends of the strands to each other and wedging one cable in one support hole and exerting a force on the other wedge member in the other bolt hole to tension the connected strand members.

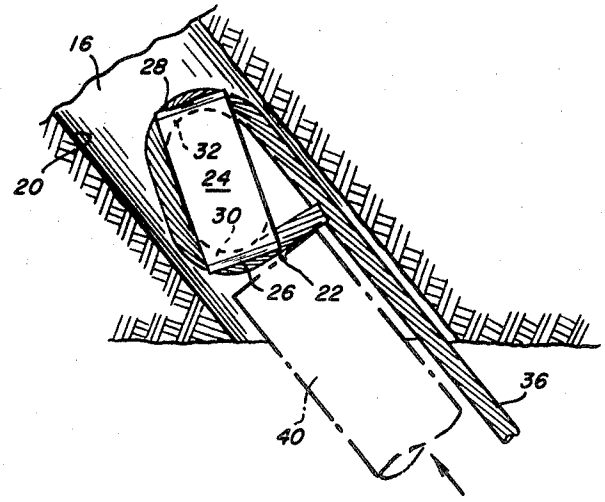


FIG. 1

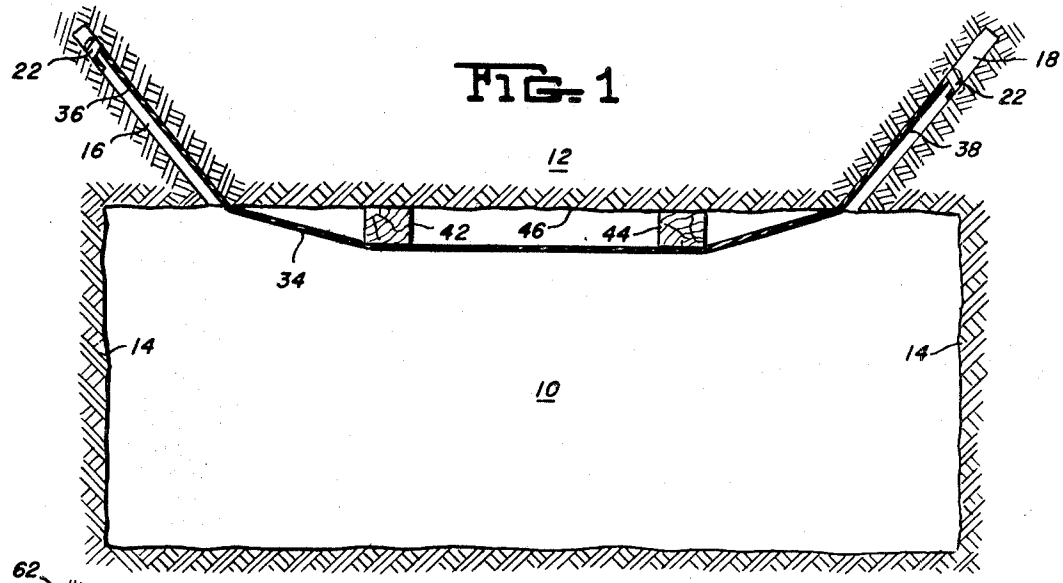


FIG. 2

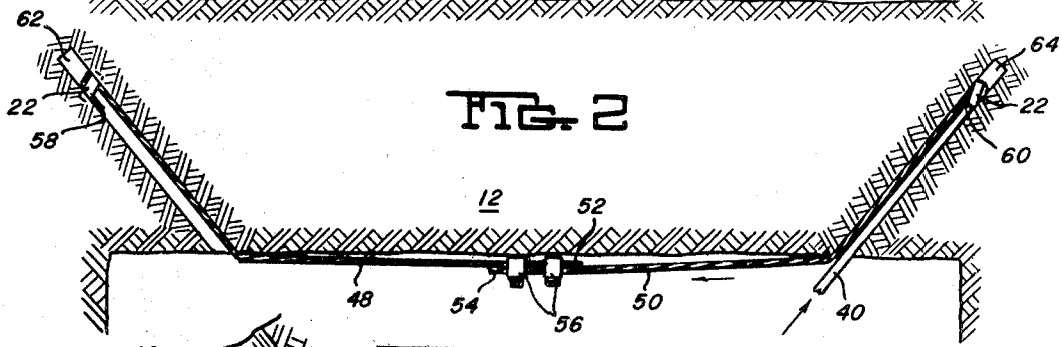


FIG. 3

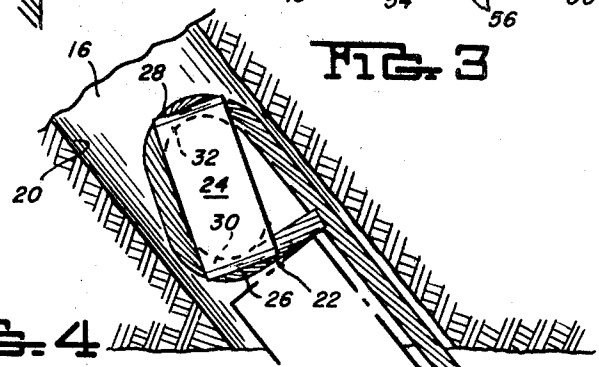


FIG. 4

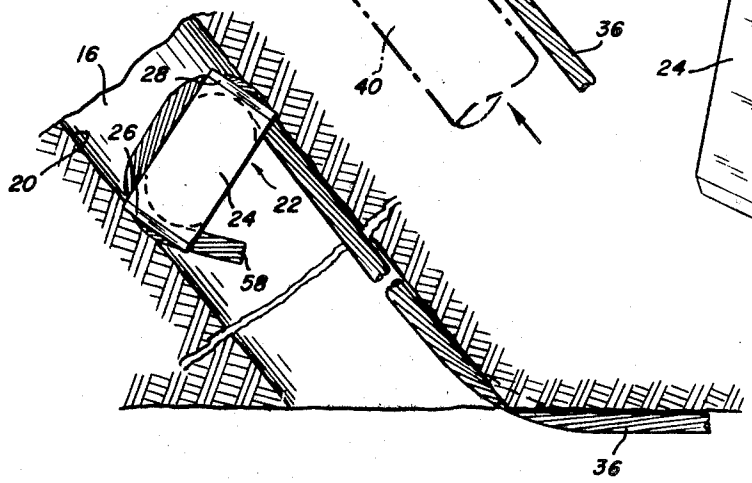
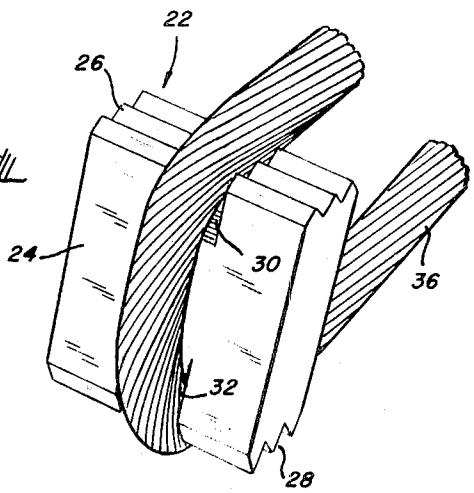


FIG. 5



INVENTOR
ALEX J. GALIS
By Stanley J. Price
his Attorney

METHOD AND APPARATUS FOR MINE ROOF SUPPORT

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to mine roof supports and more particularly to a flexible cable type mine roof support.

2. Description of the Prior Art

Mine roofs are now presently supported by roof bolts that have expansion shells and bearing plates. Vertical bolt holes are drilled in the mine roof and the roof bolts are inserted therein with the baseplate adjacent the roof surface. The bolts are rotated to expand the shell adjacent the end portion of the bolt to engage the bolt hole and to squeeze or compress the rock strata therebetween. In some installations transverse or longitudinally oriented wood or metal beams are first positioned adjacent the roof surface and the roof bolt members extend therethrough. This latter arrangement provides added roof support, especially for the rock strata adjacent the roof surface.

U.S. Pat. No. 3,427,811 discloses a roof support system that includes drilling a pair of bolt holes in the roof adjacent the pillar walls. Conventional roof bolts are positioned in the bolt holes and a flexible cable is connected to the bearing plate portion of the spaced roof bolts. The flexible cable is then tensioned by means of a turnbuckle.

SUMMARY OF THE INVENTION

Briefly, the invention relates to a method and apparatus for supporting a mine roof that eliminates the use of conventional roof bolts and provides the desired support for the mine roof. One end of a flexible cable is secured in a first support hole by means of a wedge member and the other end of the cable is secured in a second support hole spaced from the first support hole by a wedge member. The cable is tensioned between the end portions and supports the roof therebetween.

With the above arrangement the use of conventional roof bolts is eliminated and support is provided by the tensioned flexible cable. Suitable bearing means may be provided between the bolt holes.

Accordingly, the principal object of this invention is to provide a method and apparatus for mine roof support that eliminates the use of conventional roof bolts.

Another object of this invention is to provide a method and apparatus for mine roof support wherein the support is provided by a flexible cable.

These and other objects and advantages of this invention will be more completely disclosed and described in the following specification, the accompanying drawings and the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic view in elevation of a mine passageway with the roof support of the present invention.

FIG. 2 is a view similar to FIG. 1 illustrating another embodiment of the mine roof support.

FIG. 3 is a fragmentary view in elevation and in section of one of the support holes illustrating the manner in which the cable end portion and wedge member are positioned therein.

FIG. 4 is a view similar to FIG. 3 illustrating the wedge member in a rotated position wedging the flexible cable against the sidewalls of the support hole.

FIG. 5 is a perspective view of the wedge member with an end portion of the flexible cable reeved therearound.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings there is illustrated an underground mine having a passageway or haulageway 10 with a roof portion 12 and side or pillar walls 14. A pair of holes 16 and 18 are drilled upwardly into the roof through the rock strata thereabove to a predetermined depth. The holes 16 and 18 are preferably drilled at an angle, as illustrated in FIGS. 1 and 2 and adjacent the pillar walls 14 and have cylindrical sidewalls 20 formed in the rock strata.

Referring to FIG. 5 a wedge member generally designated by the numeral 22 has a body portion 24 with serrated end walls 26 and 28. Recessed portions 30 and 32 are provided in the body portion 24. The depth of the recessed portions 30 and 32 is preferably such that a portion of the cable extends outwardly beyond the serrated end walls 26 and 28, as illustrated in FIG. 5.

Referring to FIG. 1 a flexible cable 34 has a first end portion 36 and a second end portion 38. The first end portion 36 is reeved or looped about the wedge member 22 as illustrated in FIGS. 4 and 5 with portions of the cable positioned in the wedge member recessed portions 30 and 32. The cable end portion 36 and wedge 22 are inserted in the hole 16 until the wedge 22 is adjacent the base of the hole. A suitable tool, as that diagrammatically illustrated in FIG. 3 and designated by the numeral 40, is utilized to insert the wedge member with the cable end portion 36 reeved therearound. The tool 40 is retained in the position illustrated in FIG. 3 until a sufficient tension is exerted on the cable 34 to wedge the cable end portion 36 between the hole wall 20 and the wedge member 22 to maintain the wedge member 22 and cable end portion 36 in the bolt hole 16 adjacent the hole base portion.

The cable other end portion 38 is similarly reeved about a similar wedge member 22 and inserted in the bolt hole 18. Where desired, longitudinal beams 42 and 44 may be positioned between the roof surface 46 and the intermediate portion of the cable 34. A suitable tool similar to that illustrated in FIGS. 2 and 3 and designated by the numeral 40 urges the cable end portion 38 and wedge member 22 upwardly into the hole 18. A sufficient force is exerted on the wedge member 22 in hole 18 to tension the cable 34 and preferably sufficient tension is provided by the tool 40 to stretch the cable 34 to a degree that it remains below its elastic limit. The tool 40 is then removed from the hole 18 and the tension on cable 34 pivots the wedge member 22 until the serrated walls 26 and 28 are imbedded in the hole sidewalls 20 with the cable end portion wedged between the wedge member 22 and the walls 20 of the hole 18. The wedging position of the wedge member 22 is illustrated in FIG. 4. With this arrangement the cable 34 is in tension between the wedge members 22 in the holes 16 and 18 and exerts an upward force against the longitudinal beams 42 and 44 to support the roof 12.

Where it is desired to use two separate spools of cable, separate lengths 48 and 50 are cut from each spool and their end portions 52 and 54 are clamped together by suitable cable clamps 56 and their free end portions 58 and 60 are inserted in similar holes 62 and 64. Wedge members similar to members 22 have the end portions 58 and 60 looped therearound and may be simultaneously urged upwardly into the holes 62 and 64 to exert a tension on the connected cables 48 and 50 to stretch the cables so that upon release of the tools 40 the wedge members 22 pivot and wedge the cable end portions 58 and 60 against the wall 20 of the holes 62 and 64.

Alternatively the separate lengths of cable 48 and 50 may first have their end portions 58 and 60 inserted in holes 62 and 64. Sufficient tension is exerted on the separate lengths of cable to wedge the end portions 58 and 60 in the holes 62 and 64. The end portions 52 and 54 are positioned adjacent each other and are further tensioned by a suitable tensioning device. Clamps 56 secure the end portions of cables 48 and 50 while under tension to provide support for the roof therebetween.

It should be understood where desired, bearing members may be positioned between the tensioned cable and the roof surface 12 adjacent the holes. It should also be understood that the spaced holes may be arranged longitudinally in the passageway rather than transversely as illustrated in FIGS. 1 and 2. Other suitable wedge members having other configurations may be used to wedge the cable end portions against the wall of the hole and maintain the desired tension on the cable for support purposes.

With the above described roof support apparatus both ends of the cable may be simultaneously inserted in the spaced holes and tension exerted on the cable simultaneously by a pair of tools or one end of the cable may be first wedged in one of the holes and the other end of the cable thereafter wedged in the other spaced hole.

According to the provisions of the patent statutes, I have explained the principle, preferred construction and mode of operation of my invention and have illustrated and described what I now consider to represent its best embodiments.

I claim:

1. A method for supporting a mine roof comprising,
drilling a pair of spaced support holes in a mine roof,
reeving a first end portion of a flexible metallic cable around a first wedge member,
reeving the other end portion of said flexible metallic cable around a second wedge member,
inserting said first wedge member with said flexible metallic cable first end portion reeved therearound into one of said support holes with said cable end portion abutting the sidewall of said support hole,
wedging said cable first end portion between said first wedge member and said support hole sidewall,
inserting said second wedge member with said flexible metallic cable other end portion reeved therearound into the other of said support holes with said cable other end portion abutting the sidewall of said respective support hole,
wedging said cable second end portion between said second wedge member and said support hole sidewall, and
exerting a tension on said flexible cable between said end portions to urge said cable upwardly against said mine roof to support said roof thereabove.

2. A method for supporting a mine roof as set forth in claim 1 which includes,

exerting a sufficient tension on said flexible metallic cable to stretch said cable below its elastic limit, and
thereafter wedging the other end of said cable against said other support hole sidewall.

3. A method for supporting a mine roof as set forth in claim 1 which includes,
positioning elongated roof support members between said tensioned cable and said roof surface.

4. A method for supporting a mine roof as set forth in claim 1 in which,
said flexible cable includes a first section and a second section,
said first section having a first end portion and a second end portion,
inserting said first section first end portion in one of said support holes,
wedging said first section first end portion between said first wedge member and said support hole sidewall,
said second section having a first end portion and a second end portion,
inserting said second section first end portion into said other support hole,
wedging said second section first end portion between said second wedge member and said other support hole sidewall,
positioning said first section second end portion in overlapping relation with said second section second end portion,
exerting a tension on said first section and said second section and thereafter,
clamping said first section to said second section adjacent said second end portions of both of said sections while maintaining a tension on said sections to thereby provide a support for the mine roof thereabove.