

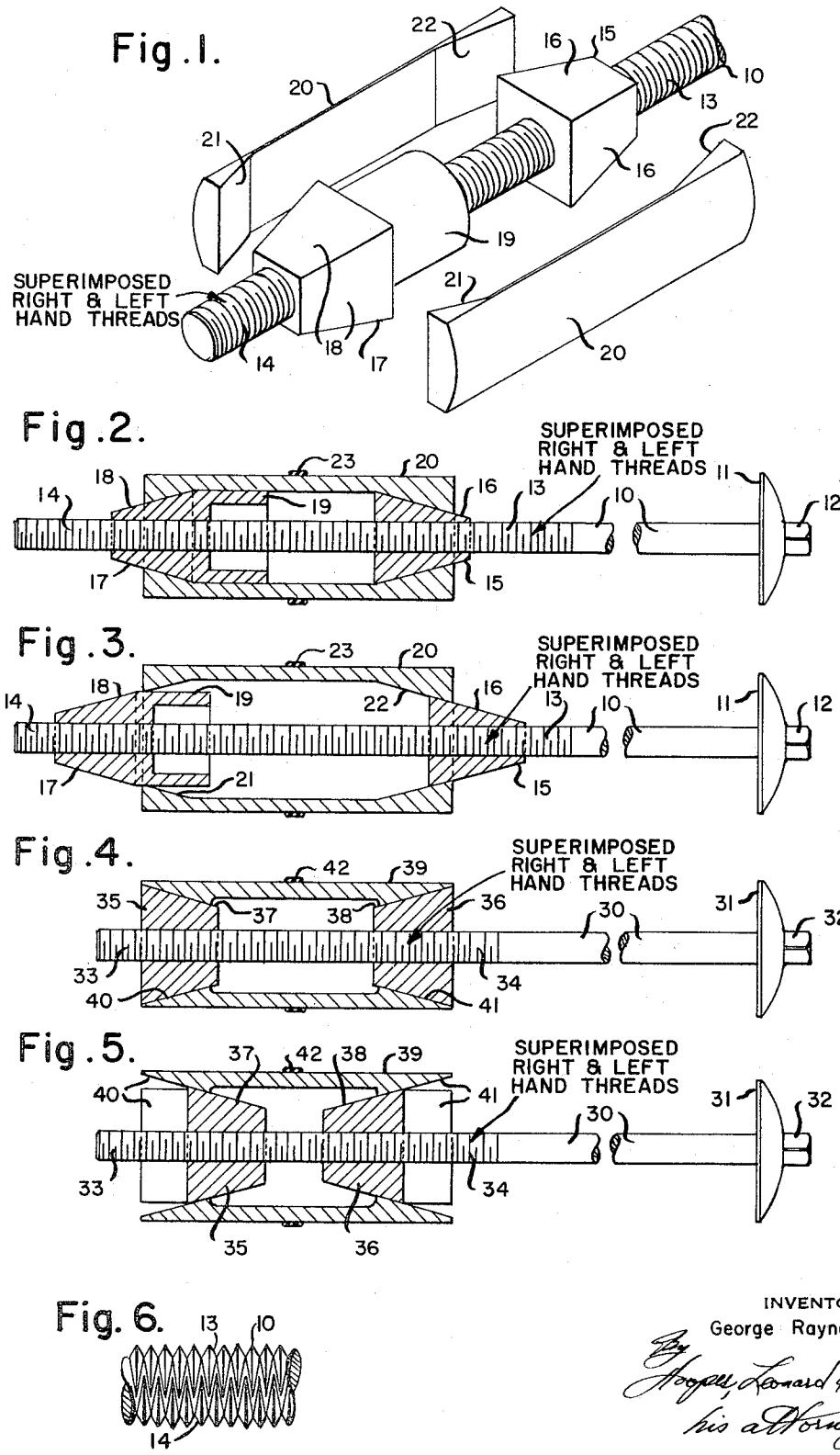
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MINE ROOF BOLTS AND THE LIKE

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1

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MINE ROOF BOLTS AND THE LIKE

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This invention relates to mine roof bolts and like structures and particularly to mine roof bolts having an expandable locking or holding member which may be positioned anywhere on the threaded portion of the bolt and expanded to hold the bolt in the earth.

The use of mine roof bolts for the purpose of supporting a mine roof against falling is not new. Many forms of bolts and fasteners have been proposed. Throughout all of the roof bolt art, however, there has existed the problems of anchorage of the bolt and the tightening of the bolt so as to assure pre-stressing of the bolt when installed into the roof.

The roof bolt of the present invention solves both of these problems. It provides a bolt which will engage firmly within the mine roof and which can be tightened to pre-stress the bolt in the roof of the mine.

In a preferred embodiment of my invention I provide an elongated bolt member having an enlarged head on one end and on the opposite end a threaded portion having superimposed right and left hand threads, a right hand threaded nut and a spaced apart left hand threaded nut on said threaded portion, a plurality of inclined faces on each of said nuts, a plurality of wedge shell members having inclined faces matching the inclined faces of the nuts and adapted to be forced outwardly by movement of the nuts with respect to one another longitudinally of the bolt and resilient means acting on the shell members urging into contact with the inclined surfaces on the nuts. Preferably the nuts have four inclined faces matching the inclined faces of a like number of wedge shells.

In the foregoing general description I have set out certain objects, advantages and purposes of this invention. Other objects, purposes and advantages will be apparent from a consideration of the following description and the accompanying drawings in which,

FIGURE 1 is an isometric view of a preferred embodiment of my invention;

FIGURE 2 is a longitudinal section with the bolt in elevation of the embodiment of FIGURE 1 in the contracted position;

FIGURE 3 is a longitudinal section with the bolt in elevation of the embodiment of FIGURE 1 in the expanded position;

FIGURE 4 is a longitudinal section with the bolt in elevation of a second embodiment of my invention in the closed position;

FIGURE 5 is a section of the embodiment of FIGURE 4 in the expanded position; and

FIGURE 6 is a detailed view showing the superimposed right and left hand threads upon the bolts of FIGURES 1-5.

Referring to the drawings I have illustrated a mine roof bolt 10 having at one end an enlarged supporting shoulder 11 and turning head 12 adapted to receive a wrench for turning the bolt. The opposite end of bolt 10 is provided with right hand threads 13 and superposed left hand threads 14. A right hand threaded nut 15 having inclined faces 16 is threaded onto the bolt. A left hand threaded nut 17 having a like number of inclined faces 18 and an elongated cylindrical collar 19 is threaded onto the bolt. A plurality of wedge shell members 20 having a short inclined surface 21 at one end matching the inclined surfaces 18 on the left hand nut 17 and a long inclined surface 22 at the opposite end matching the inclined surfaces 16 on the right hand nut are

2

placed over the nuts as shown in FIGURE 2. The wedge shell members 20 are held in position by a rubber ring 23 or like resilient means such as a spring. The threaded end of the bolt carrying the contracted wedge shells as shown in FIGURE 2 is inserted into a hole drilled in the mine roof in the usual manner until the collar 11 engages the roof surface. The rubber ring 23 and the wedge shell members 20 engage the walls of the hole drilled in the mine roof and prevent the nuts from turning as the bolt is turned. The bolt 10 is turned by the head 12, causing the right hand thread nut to move toward the collar 11 and the left hand thread to move toward the opposite end of the bolt. This causes the inclined surfaces 21 and 22 to move up the matching inclined surfaces 18 and 16, respectively of the nuts 15 and 17, expanding the resilient member 23. When the short inclined surfaces 21 reach the top of inclined surfaces 18, they rest on cylindrical portion 19 of the nut 17 permitting the nut to turn with the bolt 11 so that its position on the bolt remains stationary. The longer inclined surfaces 22 continue to bear on inclined surfaces 16 on nut 15 and expand the ends of wedge shell members 20 nearest the collar 11 to a greater degree than the end with inclines 21 providing a wedging and anchoring effect and stressing the bolt as the collar 11 is drawn tightly against the roof surface.

In the embodiment illustrated in FIGURE 4 I provide a roof bolt 30 having at one end a collar 31 and a turning head 32 adapted to receive a wrench for turning the bolt 30. At the opposite end of the bolt I provide right hand threads 33 and superposed left hand threads 34 carrying right hand threaded nut 35 and left hand threaded nut 36. The nut 35 is provided with inclined surfaces 37 and nut 36 with inclined surfaces 38. Wedge shell members 39 having inclined faces 40 and 41 at the opposite ends are placed on the nuts 35 and 36 with the faces 40 engaging the inclined faces 37 of nut 35 and inclined faces 41 engaging inclined faces 38 of nut 36. A resilient member 42 such as a resilient ring holds the wedge shell members 39 in position and urges them toward the nuts.

The bolt 30 is inserted with the threaded end carrying nuts 35 and 36 and shell members 39 in the closed position into a hole drilled in the mine roof and the collar 31 bearing against the roof surface. The bolt 30 is turned by turning head 32 causing the nuts 35 and 36 to move toward each other. This causes the inclined surfaces 40 and 41 to move up faces 37 and 38 of the two nuts 35 and 36 so that the wedge shells are forced into the sidewalls of the roof hole wedging the bolt into position and stressing it by drawing it tightly into the roof with the collar 31 bearing on the mine roof surface.

In the foregoing specification I have set out certain preferred embodiments of my invention, however, it will be understood that this invention may be otherwise practiced and embodied within the scope of the following claims.

I claim:

1. A mine roof bolt comprising an elongated bolt member having an enlarged head portion at one end and a constant diameter threaded portion at the opposite end carrying superimposed right and left hand threads, a right hand thread nut and a spaced apart left hand thread nut each threaded on said threaded portion, a plurality of inclined faces on each of said nuts, a plurality of wedge shell members equal in number to the inclined faces on each nut, said wedge shell members having inner inclined faces matching and bearing on the inclined faces of said nuts, said shell members preventing said nuts from rotating relative to each other and being adapted to be forced radially outwardly from the axis of the bolt by simultaneous longitudinal movement of the nuts relative to the bolt and resilient means surrounding the wedge shell means urging said shell means toward the inclined faces on the nuts.

3

2. A mine roof bolt comprising an elongated bolt member having an enlarged head portion at one end and a threaded portion at the opposite end carrying superimposed right and left hand threads, a right hand thread nut and a spaced apart left hand thread nut on said threaded portion, a plurality of inclined planar faces on each of said nuts, the faces on each of said nuts converging toward the respective ends of the bolt, whereby the larger ends of the nuts are in facing relationship, an integral cylindrical shell on one of said nuts extending axially thereof around the bolt from the highest point of said inclined faces toward the other of said nuts, a plurality of wedge shell members equal in number to the inclined faces on each nut, said wedge shell members having inner inclined faces at each end thereof matching and bearing on the inclined faces of said nuts, said shell members being adapted to be forced radially outwardly from the axis of the bolt by longitudinal movement of the nuts on the bolt and resilient means surrounding the wedge shell means urging said shell means toward the inclined faces on the nuts.

3. A mine roof bolt comprising an elongated bolt member having an enlarged head portion at one end and a threaded portion at the opposite end carrying superimposed right and left hand threads, a right hand thread nut and a spaced apart left hand thread nut on said threaded portion, a plurality of inclined planar faces on each of said nuts, the faces on each of said nuts converging toward the respective ends of the bolt, whereby the larger ends of the nuts are in facing relationship, an integral cylindrical shell on one of said nuts extending axially thereof around the bolt from the highest point of said inclined faces toward the other of said nuts, a plurality of

4

wedge shell members equal in number to the inclined faces on each nut, said wedge shell members having inner inclined faces at each end thereof matching and bearing on the inclined faces of said nuts, said shell members being adapted to be forced radially outwardly from the axis of the bolt by longitudinal movement of the nuts on the bolt and resilient means surrounding the wedge shell means urging said shell means toward the inclined faces on the nuts, the inclined faces of the wedge shell members bearing on the inclined surfaces of the nut carrying the cylindrical shell being shorter than those on the opposite end of said members whereby said faces run off the inclined faces on the nut and bear on the cylindrical shell permitting the nut to turn with the bolt so that its position on the bolt remains stationary.

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