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A. H. GENTER

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ROOF EXPANSION BOLT HAVING A FLEXIBLE STRAP
CONNECTING SHELL HALVES FOR ANCHORING

Filed Aug. 3, 1954

2 Sheets-Sheet 1

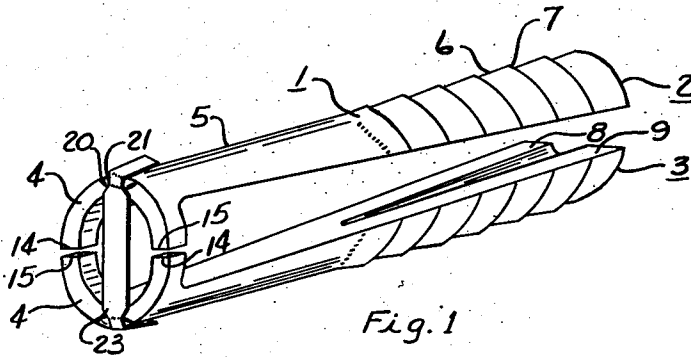


Fig. 1

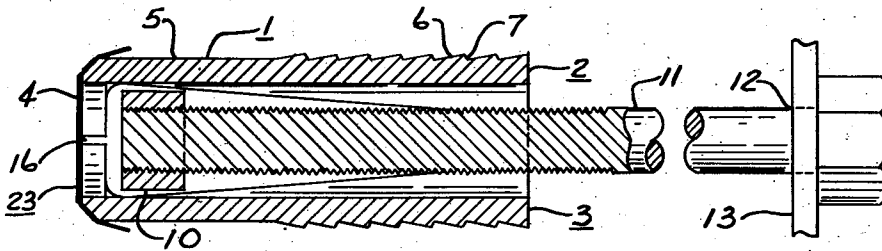


Fig. 2

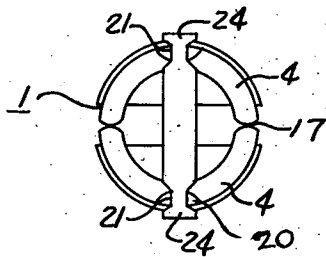


Fig. 3

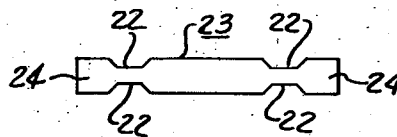


Fig. 4

INVENTOR.
ALBERT H. GENTER
BY *William D. Carruthers*
HIS ATTORNEY

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2 Sheets-Sheet 2

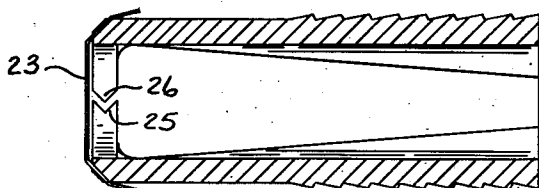


Fig. 5

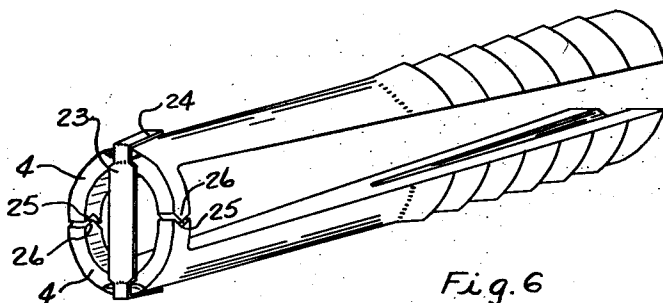


Fig. 6

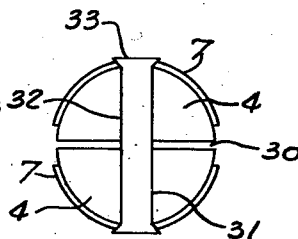


Fig. 7

INVENTOR.

ALBERT H. GENTER

BY

William H. Carothers

HIS ATTORNEY

1

2,799,201

ROOF EXPANSION BOLT HAVING A FLEXIBLE STRAP CONNECTING SHELL HALVES FOR ANCHORING

Albert H. Genter, Mount Lebanon, Pa.

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1 Claim. (Cl. 85—2.4)

This invention relates generally to expansion shells for mine roof bolts and more particularly an improved expansion shell design.

One mode of supporting a mine roof is to drill a hole up into the roof and pass a long bolt through a plate and up into the hole with a nut and expansion shell on the end thereof. When the bolt head engages the plate against the roof, the bolt is turned to draw the nut downwardly and expand the shell outwardly to tightly engage the sides of the hole.

Most expansion shells are formed in one integral casting being made of one part or casting. This construction requires a core which limits the manner in which the shells are made as well as the cost of production.

One object of the present invention is the provision of an expansion shell fabricated from duplicate halves. These halves may be stamped or cast to shape and are connected by a flexible strap.

Another object is the provision of a metal strip to provide the flexible strap connecting the duplicate halves of the expansion shell. The strip may be notched and locked in a slot across the ends of the expansion shell halves to flexibly hold them together. The locking can be done by peening the sides of the slot over on the notches in the strap.

Another object is the provision of spaced notches in the strap, one for each shell half to maintain the shell halves in spaced relation when the strap is connected thereto at the spaced notches. This prevents the halves from shifting relative to each other.

Another object is the provision of an abutment on each shell half to engage each other shell half and form a fulcrum point from which the shell halves expand. This abutment may extend the full width of shell halves. If the base of each shell half is arcuate the abutments may be spaced. These spaced abutments may have a fulcrum socket on one side and a fulcrum on the other which interlock in mating relation with a duplicate shell half to form the connecting abutments.

Another object of the invention is the provision of stiff ends on the connecting flexible strap means to extend laterally beyond the shell halves to engage in the hole into which it is inserted to lodge the same and prevent it from turning.

Other objects and advantages appear hereinafter in the following description and claim.

The accompanying drawings show for the purpose of exemplification without limiting the invention or claim thereto certain practical embodiments illustrating the principles of this invention wherein:

Fig. 1 is a perspective view of the expansion shell comprising this invention.

Fig. 2 is a sectional view of the expansion shell having a nut and bolt therein.

Fig. 3 is an end view of the shell shown in Figs. 1 and 2.

Fig. 4 is a detailed view of the flexible strap.

Fig. 5 is a view in side elevation of a shell having fulcrum type abutments.

2

Fig. 6 is a perspective view of the structure shown in Fig. 5.

Fig. 7 is an end view of an expansion shell the abutment of which extends across the base of the shell half.

Referring to the drawings the expansion shell 1 shown in Figs. 1 and 2 is made up of the halves 2 and 3 which are duplicates of each other. Each shell half is made up of a base section 4, a straight stem section 5 and a wedging finger section 6. The finger sections have a series of parallel ridges 7 on their outer face that form gripping surfaces.

Each of the gripping fingers increases in arcuate cross section from the stem section 5 outwardly as shown in Figs. 1 and 2 and the edges of the fingers are the spaced sliding wedge surfaces 8 and 9 on which the sides of the nut 10 ride when it is drawn to the right in Fig. 2 and along the threads of the bolt 11. The bolt 11 extends through a hole 12 in plate 13 and the plate 13 is held tight against the roof by the head of the bolt which is turned so as to draw the nut downwardly towards the plate and thus expand the fingers 2 and 3 that are wedged in the hole by the nut which draws the bolt head tightly against the plate 13 to hold the ceiling in place.

As shown in Figs. 1 to 3 the shell base sections 4 are provided with arcuate sections having abutments 14 and 15. The abutment 14 is opposite to the abutment 15 on the opposed shell member. These abutment surfaces may be rendered as indicated at 16 in Fig. 2 and they also may be curved in the other dimension as illustrated at 17 in Fig. 3. These abutments engage each other and permit the inner ends of the shell members to be close together while the outer fingers of the shell member extend against the walls of the hole.

The opposite outer edges of the base member are beveled as indicated at 20 and have a slot 21 formed therein. The slot 21 is relatively narrow to receive the narrow sections 22 of the flexible strap member 23 which is preferably made of material such as spring steel. The notches 22 are thus placed in the slots 21 and the metal shell is peened over to securely hold the spring strap member in place. The notches 22 in the flexible strap will permit the finger members to spring or hinge relative to one another and also permit the abutments to engage, but they will not permit them to slide relative to each other as the notches 22 prevent any relative movement longitudinally of the flexible member 23. The ends 24 of the spring member 23 may be projected downwardly to engage the wall of the bore hole and hold the expansion shells in position until the nut is drawn down sufficiently to expand the fingers and lock the shell member in the hole.

As shown in Figs. 5 and 6 the shell members are provided with complementary abutment sections. One abutment is provided with a V or fulcrum trough indicated at 25 and the other is provided with a fulcrum member 26 and when they are placed face to face fulcrum member 26 projects within the fulcrum trough 25 and thus forms a flexible joint between the two base members. This structure is likewise held by the flexible strap 23 as described in Figs. 1 to 4 inclusive. The spaced abutments in this structure are not permitted to shift laterally or otherwise slip relative to each other.

Referring specifically to Fig. 7 the abutment 30 may extend for the full width of the base member 4 and the slot member 31 may extend clear across the base members 4. The flexible member 32 can be of substantially the same width and the greater part of the same is received within the slot and the material is peened over to hold it in place. The ends 33 of the spring 32 are flared outwardly to a wider dimension to prevent movement of one shell

3

member relative to the other shell member other than a hinging action.

After the expansion shell members with the nut on the end of a bolt are placed in the bore of a hole in the roof of a mine and the nut is drawn down by turning the bolt to expand the fingers so that their outer surfaces will tightly grip the sides of the hole, the bolt may extend up through the shell members and actually push the spring 23 out of its socket and separate the expanding shell halves. However, under these conditions the shell halves are themselves locked in position by the nut 10 and there is no reason for retaining their relative position to each other. Any fault in the roof that may occur would ruin the relative position of the half members regardless of whether or not they are connected by a flexible strap. Ordinarily a structure of this type is expansible and is not removed once it is placed and therefore it is not intended to be used again. For this reason it is not important to construct the expansion shell members so that they may be retrieved.

I claim:

An anchor for a mine roof bolt expansion shell having cooperative tapering shell halves with cylindrical hole gripping outer surfaces and opposed flat inner surfaces engaged by a nut threaded on the roof bolt and a flexible strap fastened in locking grooves on the small ends of said tapered shell halves which is the hole entering end

4

of the expansion shell characterized in that said locking grooves are on the end faces of said shell halves and said flexible strap is a stiff and straight flat spring having spaced notches in its sides to independently fit in said locking grooves to prevent the shell halves from separating at their small tapered ends, the ends of said flat spring extending laterally from said locking grooves and beyond said shell halves to immediately anchor the expansion shell when entered into a hole.

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