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BOREHOLE EXPLOSIVE CHARGE RETAINER

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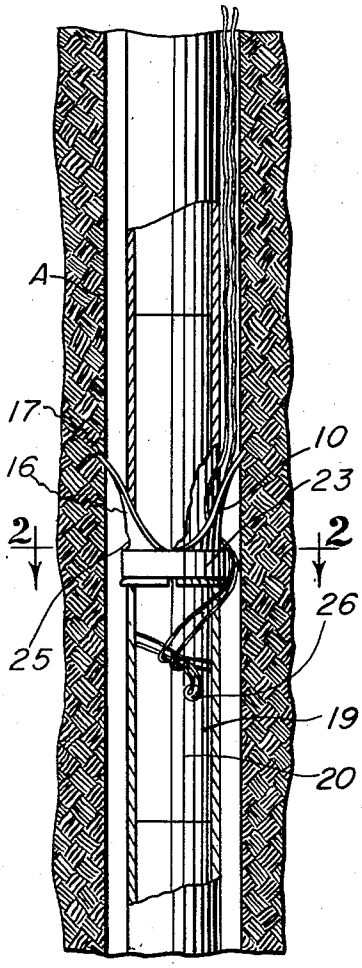


Fig. 1

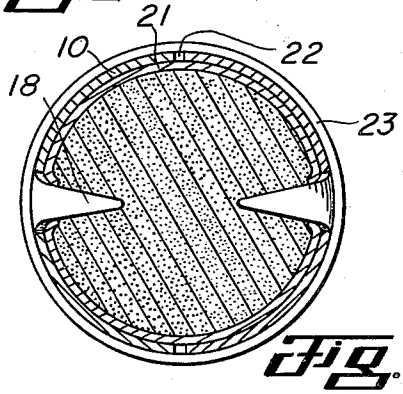


Fig. 2

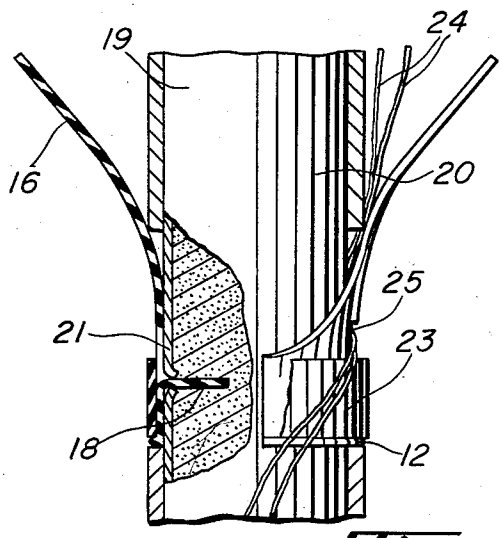


Fig. 3

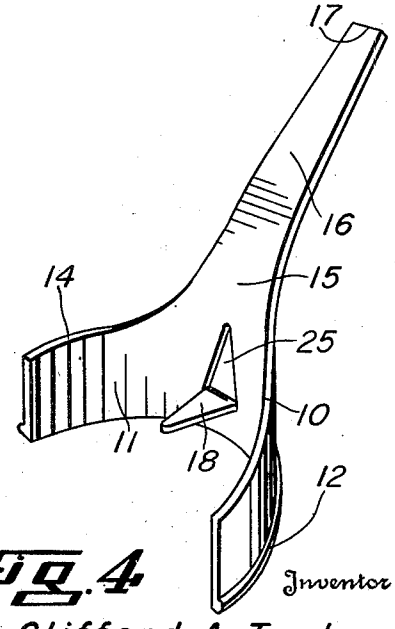


Fig. 4

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BOREHOLE EXPLOSIVE CHARGE RETAINER

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6 Claims. (Cl. 102—21.8)

This invention relates to new and useful improvements in borehole explosive charge retainers.

One object of the invention is to provide an improved borehole charge retainer arranged to be engaged around the explosive charge and acting to securely hold the charge container at the desired elevation against upward movement in the borehole.

A further object is to provide an improved charge retainer made of plastic material, whereby it is a non-conductor of electrical currents, inexpensive, pliable, and is so formed as to provide a positive anchoring means capable of resisting any upward pull sufficient to move it upwardly in the hole.

Another object is to provide an improved charge retainer including two members having means for securely fastening them around an explosive charge container and equipped with outwardly and upwardly directed wall-engaging wings.

A construction designed to carry out the invention will be hereinafter described together with other features of the invention.

The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawing, wherein an example of the invention is shown, and wherein:

Fig. 1 is a transverse, vertical, sectional view of a borehole with an explosive charge supported therein by a charge retainer constructed in accordance with the invention,

Fig. 2 is an enlarged, horizontal, cross-sectional view taken on the line 2—2 of Fig. 1,

Fig. 3 is an enlarged view of the retainer, partly in elevation and partly in vertical section, and

Fig. 4 is a perspective view of one of the retainer members.

In the drawing, the numeral **10** designates a yoke-shaped retaining member of which two are employed to provide a retainer. Each member includes a semi-circular base band **11** having an external peripheral bead **12** at its lower edge. The upper edge **14** of each band is merged into a transversely curved and outwardly directed shank **15**. The latter is reduced transversely toward its upper portion which is curved outwardly and merged into an upwardly inclined prong or wing **16**. Each wing is gradually reduced in width toward its upper outer end **17** which preferably is blunt. Each member has an inwardly directed, triangular prong or tongue **18** struck therefrom at the intermediate, upper portion of its band **11** below the shank **15**.

The members **10** are assembled ends around an explosive charge **20** between the ends of the usual fragile tubes **19**. The tongues **18** are forced through the jacket **21** of the charge **20** and are embedded therein, as is best shown in Fig. 3, so that the bands **11** encircle and snugly embrace the charge. There are vertical spaces **22** between the ends of the bands **11** and the jacket **21** is pliable enough to permit these bands to be pressed together sufficiently to allow an annular flat element or ring **23** to be pushed upwardly over the beads **12** and engaged around the bands. When in position, the lower edge of the ring rests on the beads and has its upper edge approximately at the upper edge of the bands. Sufficient internal pressure is exerted against the bands to hold them in the ring.

Electrical firing lines **24** extend into the well bore A and are passed between the jacket **21** and the inner face of one of the shanks **15** and thence out through an opening **25** formed by the cutting of the tongue **18**. It is noted that the opening **25** is sufficiently large to permit the passage therethrough of a detonator **26** connected to the lower

ends of the lines **24**. The lines overlie the ring **23** and are tied or looped in a half hitch around the jacket. The detonator **26** is forced through the jacket and embedded in the charge in the usual manner. As shown in Fig. 1, the ends **17** of the wings **16** dig into the wall of the well bore upon upward movement of the retainer, or catch in cavities of a hard formation. It is obvious that pulling upwardly on the lines **24** does not lift the retainer due to the engagement of the wings with the bore wall. These wings may also act to suspend the charge **20** in the borehole.

The wings are flexible enough to permit the charge to be forced down the borehole. The borehole is filled preferably with water. Since it is frequently necessary to leave a charge in a borehole for a period of time, the danger of someone removing or raising the charge to a dangerous position is eliminated by the retainer. The entire retainer is made of suitable material such as plastic, which is dielectric, non-corrosive, inexpensive and which may be readily molded or otherwise formed.

The foregoing description of the invention is explanatory thereof and various changes in the size, shape and materials, as well as in the details of the illustrated construction may be made, within the scope of the appended claims, without departing from the spirit of the invention.

What I claim and desire to secure by Letters Patent is:

1. A borehole charge retainer including, yoke-shaped non-metallic members, each member including a semi-circular band at its bottom, a shank integral with the band and extending upwardly and outwardly from the upper portion of said band, the shank having an upwardly and outwardly directed wing integral therewith, and a non-metallic ring surrounding the bands of the members, whereby a dielectric non-corrosive retainer is provided.

2. A borehole charge retainer as set forth in claim 1, wherein each band has a bead along its bottom supporting the ring.

3. A borehole charge retainer as set forth in claim 1, wherein each band has an inwardly directed tongue integral therewith and below its shank.

4. A wholly plastic borehole charge retainer including, separate unitary upright members, each member comprising a single one-piece structure including an arcuate base shaped to engage partially around an explosive charge with a shank integral with the base and directed upwardly therefrom and provided with an integral outwardly directed terminal prong for engaging in a borehole wall, an inwardly projecting tongue on each base adapted to penetrate and engage in an explosive charge, and a plastic ring engaging around the bases of the members for securing them around an explosive charge with the prongs directed outwardly and free to engage in the wall of a borehole.

5. A wholly plastic borehole charge retainer as set forth in claim 4, wherein at least one of the bands has an opening therein for the passage of an electric circuit wire therethrough from one side of the member.

6. A wholly non-metallic borehole explosive charge retainer including, separate unitary members, each member comprising a single one-piece non-metallic flexible structure including an arcuate base shaped to engage partially around an explosive charge and a shank integral with the base and directed upwardly therefrom, the shank having an upwardly and outwardly directed terminal prong integral therewith for engaging in a borehole wall, and a non-metallic flexible ring surrounding the bases of the members for holding said bases around an explosive charge.

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