Feb. 23, 1965 R. G. NELSON 3,170,400

DETONATING MEANS SECURING DEVICE

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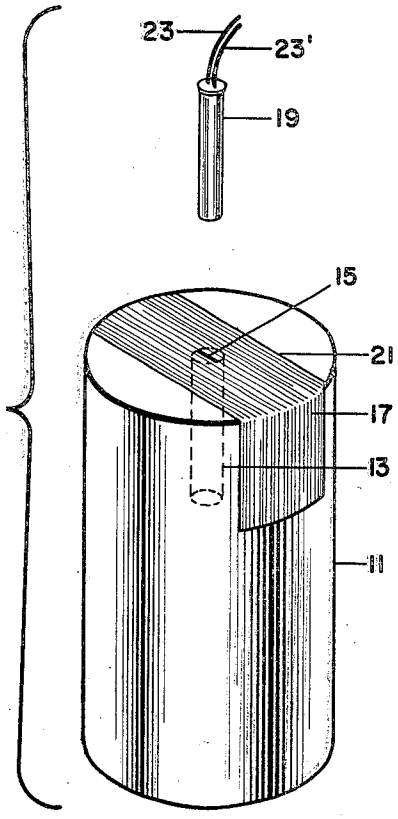


FIG. 1

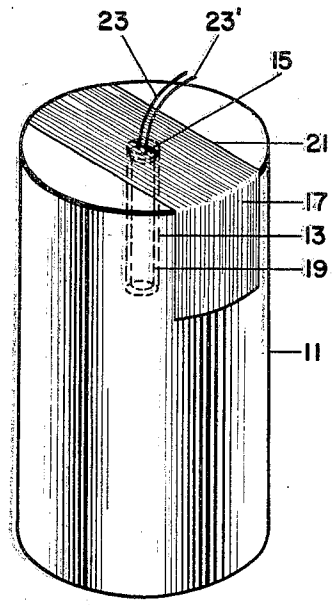


FIG. 2

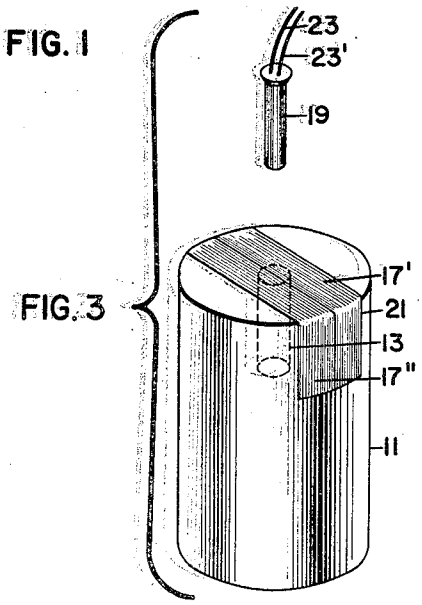


FIG. 3

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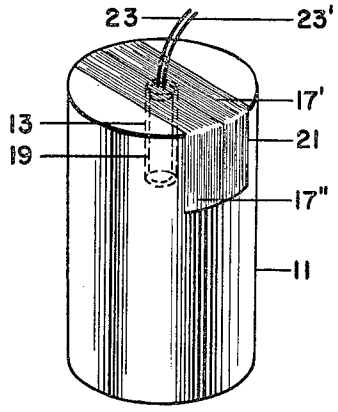


FIG. 4

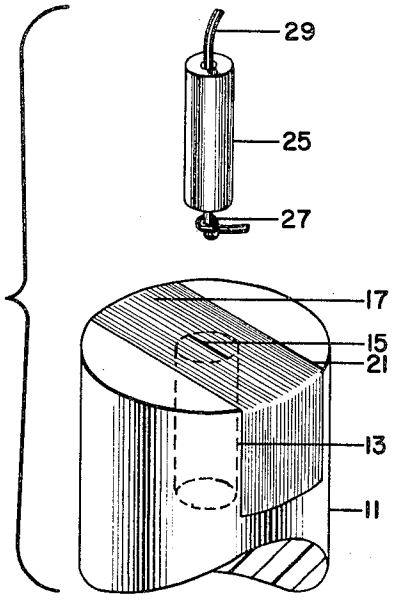


FIG. 5

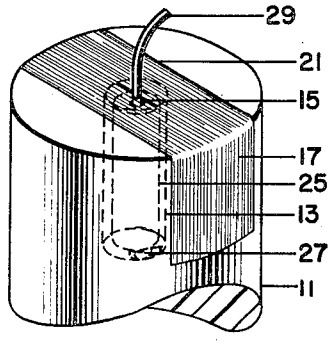


FIG. 6

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DETONATING MEANS SECURING DEVICE

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5 Claims. (Cl. 102—24)

The present invention relates to a detonating means securing device and to an explosive assembly equipped with such device. Specifically, the present invention relates to a device to secure an electric detonator or booster charge within a base explosive charge and to a blasting assembly comprised of an explosive charge having an electric detonator or booster charge secured therein by the securing device.

Base explosive charges are commonly equipped with a perforation or small hole called a well, which facilitates the insertion of a detonating means within the charge. When a suitable detonating means is positioned in the well of an explosive charge proper initiation of the explosive is assured. Loading and tamping operations after the detonating means has been positioned in the well must be carefully carried out in order to insure that the detonating means remains in place, as displacement of the detonating means frequently results in a misfire. The present invention provides a securing means which insures that once the detonating means is positioned within the well it is held secure against outward displacement. The present invention provides a means of securing a detonating means within an explosive charge without resorting to the use of metal components which may be considered objectionable from a safety standpoint.

As used herein the term "filament tape" is defined to include tapes wherein the tape is reinforced by a layer comprised of a plurality of substantially continuous strands, or filaments, of a strong, high tenacity material. In commercially available tapes which are suited to carry out this invention the filaments are generally disposed parallel to the edges of the tape. The tape may have shorter spaced cross strands disposed at an angle to the substantially continuous strands. The substantially continuous strands may be made of glass, cellulose acetate, cellulose propionate, superpolyamides of the nylon type, rayon, silk, or vinylidene chloride interpolymers, e.g., with vinyl chloride and/or acrylonitrile. The spaced cross strands may be woven or nonwoven with the substantially continuous strands. Examples of filament tapes suited to carry out the present invention are described in the following U.S. patents: 2,750,314; 2,750,315 and 2,744,041.

According to the present invention a means of securing a detonating means in the well of an explosive charge is provided by the utilization of a piece of filament tape. Filament tapes having a coating of pressure sensitive adhesive on one side and having a layer of substantially continuous filaments predominantly disposed in a direction parallel to the edges of the tape are eminently suited to use in the present invention. In a preferred embodiment of the present invention, a length of tape is placed over the well of an explosive charge with the ends of the tape extending beyond the opening of the well in two directions. The extending ends of the tape are secured to the explosive charge on either side of the well to form an explosive assembly. It is preferred that the well in the explosive charge be of an adequate depth to receive the entire detonating means. A small slit, approximately equal in length to the width of the detonating means to be used, is cut through the tape along a direction parallel to the length of the tape. The slit is positioned directly over the well. In practice, it is simplest to first position the tape on the explosive charge and then slit the tape at a point just over the well.

To form an armed blasting assembly, the detonating means is inserted into the well of the explosive charge equipped with the securing means by passing the detonating means through the slit in the filament tape. After the detonating means has been inserted into the well, the filaments of the tape tend to spring back to their original position thereby securing the detonating means against outward displacement caused by movement of the charge or by forces tending to pull the detonating means out of the well.

It will be appreciated that the tape, positioned over the well of the explosive charge, protects the well against entry of foreign materials, such as dirt or rock chips which could create a hazard in the arming operation.

Although it is not a preferred form of the present invention, securing action may also be carried out by utilization of two lengths of filament tape in juxtaposition which are secured to the explosive charge and positioned so that the juncture of the two lengths of tape lies immediately over the well. A detonating means may then be inserted through the tape juncture at a point just over the well and is thereby secured in the well by the overlying tape.

The term "detonating means" as used herein will be understood to include electric detonators, detonating fuse, and booster or primer charges. In any case, the base explosive charge is perforated to receive the detonating means therein. In case a length of detonating fuse is to be secured a knot is placed in the end to be received by the base explosive charge and the knot passed through the slit in the tape securing means. The present invention facilitates the secure placement of booster or primer charges within a base charge. Booster or primer charges utilized with the securing device of the present invention may be perforated to receive an initiating means, such as an electric detonator or a length of detonating fuse, therein. In case a length of detonating fuse is utilized along with a booster or primer charge, the charge is preferably perforated so that the detonating fuse may be threaded therethrough and secured from outward displacement therefrom by a knot placed in the end extended through the charge. In case an electric detonator is utilized a slitted tape securing means may be affixed to the charge, the electric detonator or fuse cap secured in the charge and the combination secured within the base charge.

The invention may be more clearly understood by reference to the accompanying drawings which will serve to illustrate typical embodiments of the present invention and which like parts are identified by similar reference numbers throughout the several views.

FIGURE 1 is a perspective view showing an explosive charge equipped with a length of filament tape and an electric detonator prior to insertion into the charge.

FIGURE 2 is a perspective view showing an armed blasting assembly comprised of the explosive charge of FIGURE 1 after the inertion of a detonator therein.

FIGURES 3 and 4 are perspective views comparable to FIGURES 1 and 2, except that they show a securing means comprised of two lengths of filament tape in juxtaposition over the well in the explosive charge.

FIGURE 5 is a perspective view showing an explosive charge equipped with a length of filament tape and a sleeve-type booster charge having a length of detonating fuse threaded therethrough and secured from withdrawal by a knot.

FIGURE 6 is also a perspective view showing the explosive charge of FIGURE 5 after insertion of the booster charge shown in FIGURE 5.

Referring to FIGURE 1 in detail: An explosive charge is shown as a generally cylindrical cartridge **11**. The explosive charge will generally consist of a suitable amount of a common detonating explosive such as dynamite, RDX, Composition B or PETN. The explosive charge may be in the form of a solid or powder and may be either molded or packed in a cartridge. The charge has a surface suited to secure a length of suitable filament tape. The charge is equipped with a well **13** of a length sufficient to completely receive an electric detonator. Well **13** is covered with a length of adhesive filament tape **17** extending beyond the top of the well and secured to the side wall of explosive charge **11** and forms an explosive assembly. Tape **17** has a slit **15** positioned parallel to the direction of the predominant filaments **21** in the tape. An electric detonator **19** having leg wires **23** and **23'** is shown in position to be inserted into well **13** through slit **15** in tape **17**.

FIGURE 2 shows the explosive assembly of FIGURE 1 after the electric detonator is inserted and secured therein by tape **17** to form an armed blasting assembly.

Referring now to FIGURE 3 in detail: An explosive charge **11**, having a well **13** is equipped with a securing means comprised of two lengths of filament tape **17'** and **17''**. Tape lengths **17'** and **17''** are in juxtaposition with the side juncture of the lengths lying immediately over well **13**. The ends of tapes **17'** and **17''** are secured to the side wall of explosive charge **11**. An electric detonator **19** having leg wires **23** and **23'** is shown in position to be inserted into well **13** through the juncture of tapes **17'** and **17''** at a point immediately over well **13**.

FIGURE 4 shows the explosive charge of FIGURE 3 after the detonator has been inserted and secured within the explosive charge **11** to form an armed blasting assembly.

Referring now to FIGURE 5 in detail: An explosive charge **11** is equipped with a well **13** of sufficient length to completely receive a booster assembly comprised of booster **25** and a length of 50 grain detonating fuse (50 grains of PETN per foot) **27** extending therethrough and terminating in knot **29**. A booster arrangement is usually utilized to initiate relatively insensitive explosive charges, such as mixtures containing a high percent by weight of ammonium nitrate sensitized with a carbonaceous material. Generally such mixtures are insensitive to either a #6 blasting detonator or 50 grain detonating fuse and require a booster or primer charge for initiation. The explosive charge in booster **25** is a detonator or detonating fuse sensitive high explosive for example, RDX, Composition B, or PETN. Well **13** is covered with a length of adhesive filament tape **17** extending beyond the top of the well and secured to the side wall of base explosive charge **11** to form an explosive assembly. Tape **17** has a slit **15** positioned parallel to the predominant filaments **21** in the tape. FIGURE 6 shows the explosive charge of FIGURE 5 after the booster assembly is inserted and secured therein by tape **17** to form an armed blasting assembly.

As a result of this invention, it will be noted that an explosive assembly may now be produced that is equipped with a well adapted to receive a detonating means and a means of securing the detonating means

therein which entails no complicated or undesirable components and which facilitates easy packing and storage. The explosive assembly is adapted to quickly and easily receive and secure detonating means therein to form an armed blasting assembly.

What is claimed is:

1. An explosive assembly comprising an explosive charge containing a well, said well being of a size to receive an electric detonator, a length of filament tape covering said well and secured to said explosive charge on either side of said well, said filament tape having a slit therein positioned immediately over said well, said slit being parallel to the direction of the longest filaments in said length of filament tape.

2. An explosive assembly comprising an explosive charge containing a well, a length of filament tape covering said well, said tape having a layer of adhesive and a layer comprised of a plurality of filaments disposed in a direction parallel to the edges of the tape, said tape having a slit therein positioned parallel to the direction of the longest filaments, the ends of said length of tape being adhesively secured to said explosive charge so that the slit in said tape lies immediately over the well in said charge.

3. An explosive assembly comprising an explosive charge containing a well adapted to receive a detonating means, two parallel lengths of filament tape having a layer of adhesive and located in juxtaposition covering said well and adhesively secured to the explosive charge, the side juncture of said lengths of filament tape lying across the diameter of said well.

4. A blasting assembly comprising an explosive charge containing a well, a length of filament tape having a layer of adhesive covering said well, the ends of said length of tape being adhesively secured to said explosive charge, said length of tape having a slit therein positioned parallel to the direction of the length of the longest filaments in the tape, an electric detonator positioned in said well and having leg wires extending through said slit in said tape, said detonator secured against outward disengagement from said explosive charge by the portion of filament tape positioned over said well.

5. A blasting assembly comprising an explosive charge containing a well, two lengths of filament tape having a layer of adhesive and located in juxtaposition covering said well and adhesively secured to the explosive charge, the side juncture of said lengths of filament tape lying across the width of said well, an electric detonator in said well having leg wires extending through the juncture of said lengths of tape, said detonator being secured in said well against outward disengagement with said explosive charge by said lengths of filament tape.

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