Nov. 28, 1967 R. G. NELSON 3,354,827

WATERPROOF PRIMER CARTRIDGE

Filed May 2, 1966 3 Sheets-Sheet 1

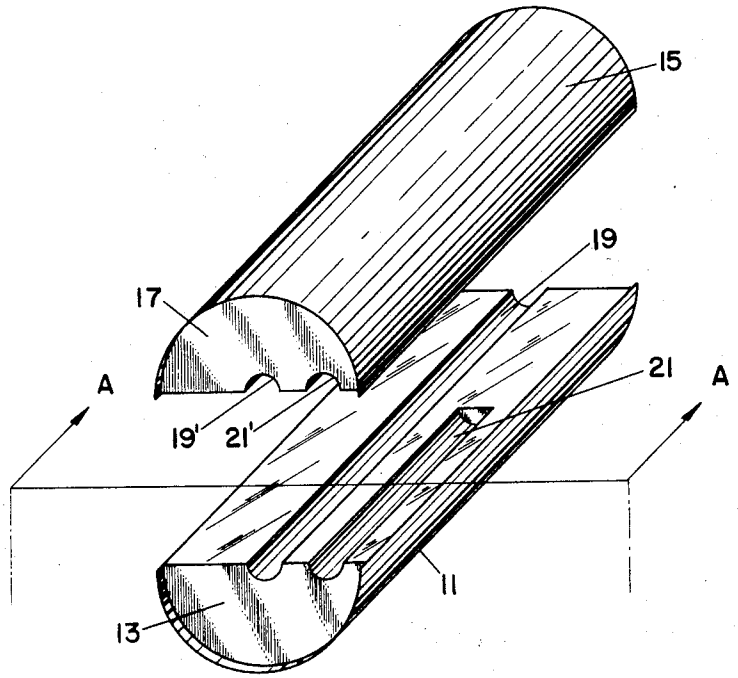


FIG. 1

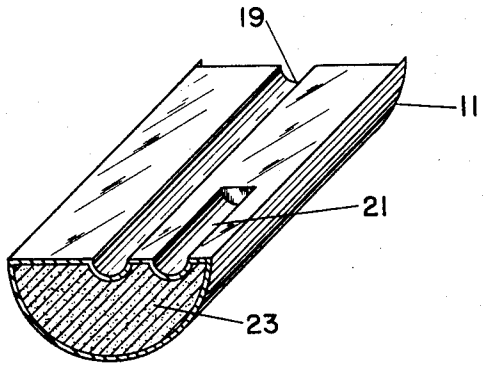


FIG. 2

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WATERPROOF PRIMER CARTRIDGE

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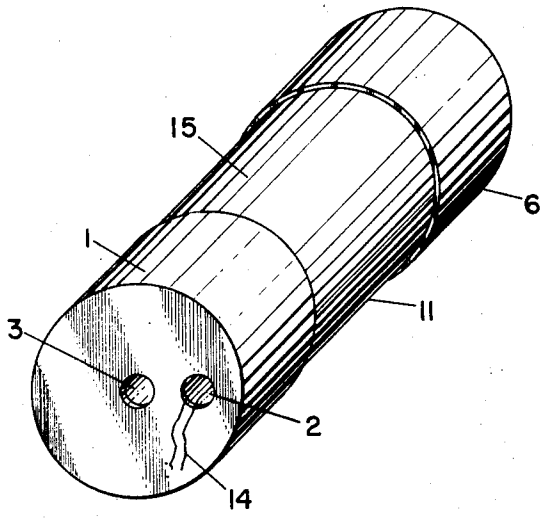


FIG. 3

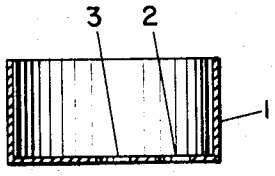


FIG. 4

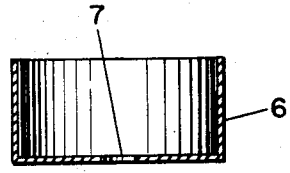


FIG. 5

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WATERPROOF PRIMER CARTRIDGE

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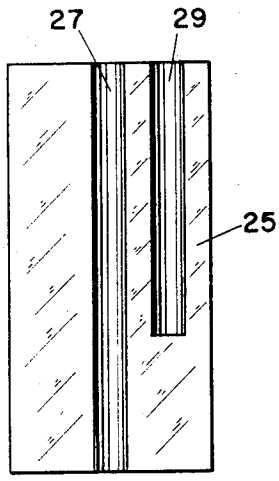


FIG. 6

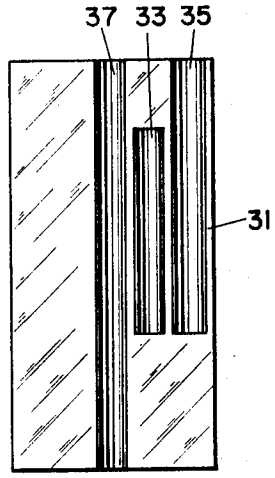


FIG. 7

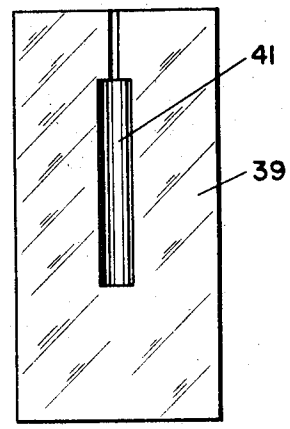


FIG. 8

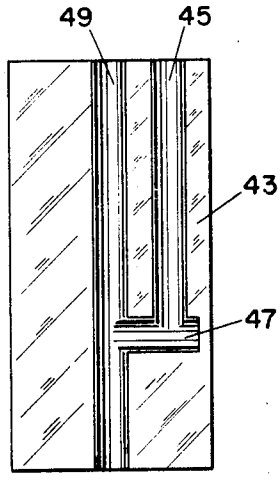


FIG. 9

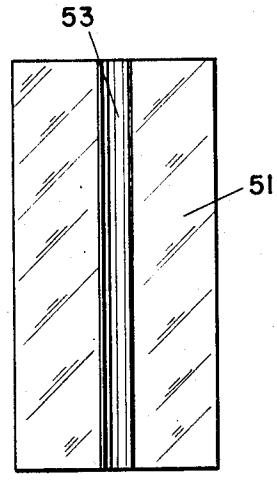


FIG. 10

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3,354,827

WATERPROOF PRIMER CARTRIDGE

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Filed May 2, 1966, Ser. No. 546,667
7 Claims. (Cl. 102—24)

ABSTRACT OF THE DISCLOSURE

An explosive, waterproof priming device for use in detonating relatively insensitive explosive charges. The priming device includes a main explosive charge disposed in two elongated and waterproof sections, each of which sections is provided with a flat or otherwise mating face surface, and means for holding the said elongated sections in face-to-face relationship.

This invention relates to an explosive priming device for use in detonating relatively insensitive explosive charges in a borehole and more particularly to a waterproof priming device adapted to contain a main charge and a blasting cap, a detonating cord or a booster charge or a combination thereof.

The required water resistance of a priming device or assembly for reliable operation under wet borehole conditions is rather readily obtained when the main exposive charge in the priming device is water resistant such as gelatin dynamites and cast pentolite. However, economic conditions favor the use of relatively inexpensive and less water resistant explosives as the main charge, for example, nongelatinous nitroglycerin dynamites, nitrostarch sensitized explosives, nitric acid sensitized ammonium nitrate slurries and TNT sensitized explosives. Therefore, in the later case the required water resistance must be provided by the container for such a priming assembly.

In the prior are, primer assemblies containing main primer charges having little or no water resistance are packaged in metal cans and the detonator element is generally positioned in or against the side wall of the primer can. In the case of using a blasting cap as a detonator, a preformed cap well is sometimes soldered or cemented on the side of the can to accommodate the cap; whereas, when a detonating cord is used as an initiator an external tunnel plate is attached to the can to contain the cord. Such assemblies provide for only minimum contact between the detonator element and the main charge in the primer assembly and tend to affect the balance of the primer assembly causing it to bind to the side wall when being slide down a borehole.

In accordance with the present invention an explosive priming device is provided which comprises two elongated sections having mating surfaces wherein each mating surface is provided with at least one mirror image depression or groove. The sections may be any shape as long as each section is provided with a flat or otherwise mating surface for bring into kissing contact with another section. A main explosive charge is sealed within each of the said elongated sections and means are provided for holding the said elongated sections in a face to face relationship.

The elongated sections of the present device may be made of any suitable materials which can be shaped in accordance with the present invention and which is capable of being formed into a waterproof container for holding the main charge. For example, the present cartridge may be made of a plastic material such as polyvinyl chloride, polypropylene or polyethylene. Alternatively, the present primer cartridge may be made from metal, for

example, tin plate or aluminum. Each face of the two elongated sections that make-up the present cartridge is provided with suitable mirror image grooves to accommodate a blasting cap, detonating cord or booster or combination thereof. The main explosive charge to be used is placed in both elongated sections of the present primer through open ends in each of the said sections. After the main charge has been placed in each of the elongated sections the ends thereof are sealed in place so as to yield a water tight seal. The main charge may be comprised of any suitable explosive material. For example, water sensitive explosives such as a nitric acid sensitized ammonium nitrate slurry may be used as the main charge. In operation, after the present primer has been loaded with the main charge, generally at the explosive plant, it is shipped to the blasting site where it is to be used. At the time of use a suitable detonator such as a blasting cap and/or booster are placed in appropriate grooves in one of the elongated sections. Then, two sections of the primer are sandwiched together and held in contact by any suitable means, for example, by a slip fit cap over each end thereof, a slip fit sleeve over the length of said primer, by wrapping water-resistant tape around the formed sandwiched cylinder or by gluing or solvent sealing.

A blasting cap suitable for use as a detonator in the present primer cartridge may be any of the commercially available waterproof caps such as a No. 6 or No. 8 blasting cap. A booster suitable for use in combination with the present primer assembly may be any commercially available booster of a suitable size to fit in the subject primer cartridge. Such a booster is water resistant and is comprised of a solid mass of a suitable booster composition containing an explosive such as PETN or pentolite.

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

FIGURE 1 is a perspective view showing two hemicylindrical sections of a primer of the present invention.

FIGURE 2 is a partially sectional view of a hemicylindrical section of FIGURE 1 shown along the line A—A.

FIGURE 3 is a perspective view showing an assembled primer of the present invention.

FIGURE 4 is a cross-sectional view of a slip on cap suitable for passing over one end of the sandwiched sections of FIGURE 1.

FIGURE 5 is a cross-sectional view of a slip on cap suitable for passing over one end of the sandwiched sections of FIGURE 1.

FIGURES 6, 7, 8, 9 and 10 are perspective views of the faces of various hemicylindrical sections of the present invention.

FIGURE 1 shows two separated hemicylindrical sections **11** and **15** of the present device having mirror image depressions or grooves **19**, **21**, **19'** and **21'** respectively. Sections **11** and **15** are made from a plastic material or metal. The main charge **23** as shown in FIGURE 2 is sealed into each hemicylindrical section **11** and **15** by means of ends **13** and **17** respectively. The sealing of end **13** and **17** in place may be suitably accomplished by heat sealing, solvent sealing or by an adhesive if sections **11** and **15** and ends **13** and **17** are made of a plastic material. If the primer sections are made of metal, the end seals **13** and **17** may be soldered or rolled in place.

An assembled primer of the present invention is shown in FIGURE 3. Leg wires **14** are shown leading through off center hole **2** in cap **1** from a blasting cap sandwiched between sections **11** and **15** in mirror image depressions **21** and **21'**. A cross section of cap **1** is shown in FIGURE 4. Hole **2** is positioned in cap **1** so as to be

in alignment with depressions **21** and **21'** when sections **11** and **15** are sandwiched together. Hole **3** is positioned in cap **1** so as to be in alignment with detonating cord depressions **19** and **19'** when the primer sections are suitably assembled. Cap **6** shown in FIGURE 5 is provided with hole **7** to be in alignment with depressions **19** and **19'** when fitted over the opposite ends of sections **11** and **15** as shown in FIGURE 3.

The faces of hemicylindrical sections of the present primer shown in FIGURES 6–10 are grooved in various manners to accommodate a plurality of detonating means. The face of hemicylindrical section **25** in FIGURE 6 is provided with detonating cord depression **27** and blasting cap groove **29**. FIGURE 7 shows hemicylindrical section **31** provided with booster depression **33**, blasting cap groove **35** and detonator depression **37**. Hemicylindrical section **39** shown in FIGURE 8 is provided only with cap well **41**. A hemicylindrical section **43** of a primer of the present invention shown in FIGURE 9 is provided with a detonating cord groove **49**, blasting cap well **45** and a depression **47** to accommodate a booster at the end of well **45**. Hemicylindrical section **51** shown in FIGURE 10 is provided with a groove **53** to receive a detonating cord.

What is claimed is:

1. A cylindrical explosive priming device which comprises, two elongated hemicylindrical waterproof sections each having mating surfaces and containing an explosive charge sealed therein, each of said mating surfaces provided with at least one mirror image depression, and means for holding the said elongated waterproof sections together with contact of said mating surfaces.

2. An explosive priming device of claim **1** wherein the depressions are adapted to hold a blasting cap, a detonating cord, or a booster charge or a combination thereof.

3. An explosive priming device of claim **1** wherein the elongated sections are held in face to face relationship by means of a slip on cap over each end of said sections.

4. An explosive priming device of claim **1** wherein the hemicylindrical sections are made of a plastic material.

5. An explosive priming device of claim **1** wherein the hemicylindrical sections are made of a metallic material.

6. An explosive priming device of claim **1** wherein the hemicylindrical sections are held in face to face relationship by means of water-resistant tape.

7. An explosive priming device of claim **1** wherein the explosive charge is a water sensitive explosive.

References Cited

UNITED STATES PATENTS

3,183,836	5/1965	Griffith	102—24
3,212,438	11/1965	Lawrence	102—24
3,233,688	2/1966	Bell	102—24

FOREIGN PATENTS

1,295,471	5/1962	France.

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