United States Patent

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[73] Assignee **The United States of America as represented by the Secretary of the Army**

[54] **NONELECTRIC SQUIB ASSEMBLY**
1 Claim, 1 Drawing Fig.

[52] **U.S. Cl.** **102/29**
[51] **Int. Cl.** **F42c 15/06**
[50] **Field of Search** ..... 102/27, 29, 45, 49.7, 70, 86.5, DIG. 1

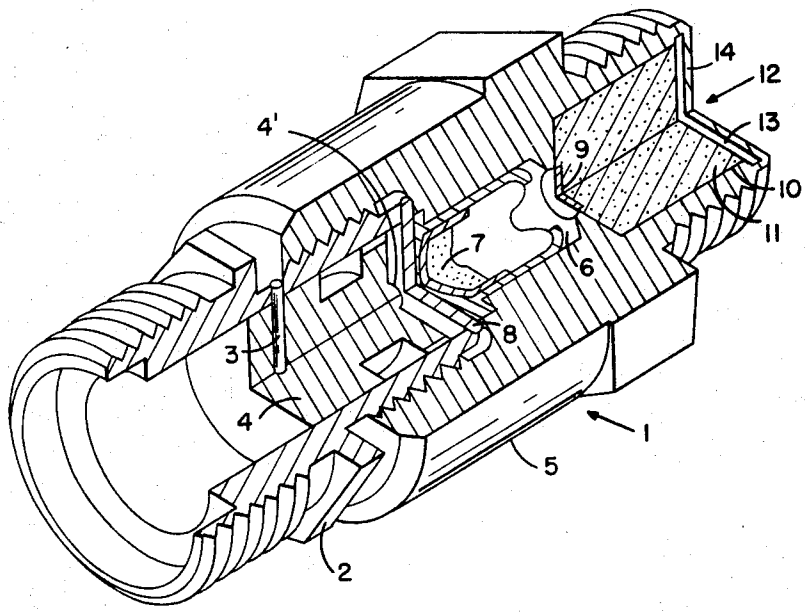
[56] **References Cited**

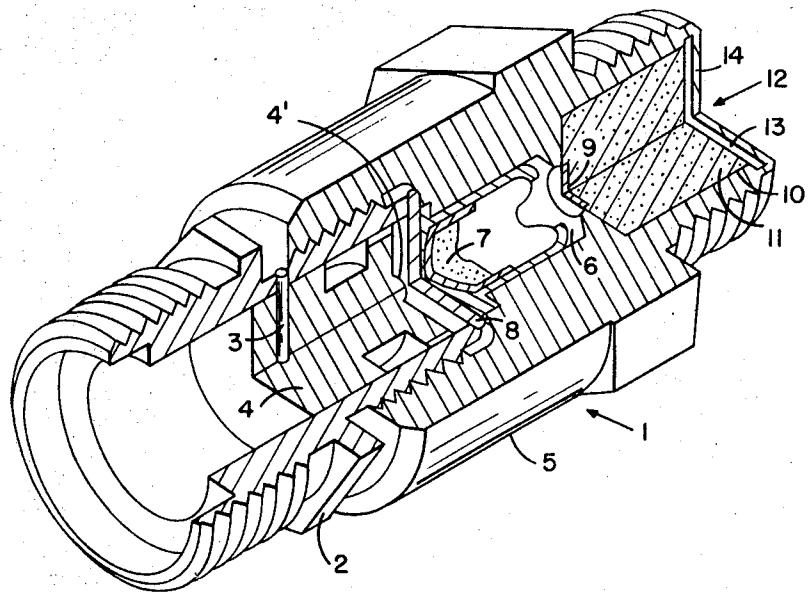
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ABSTRACT: A nonelectric squib assembly consisting of a squib body and a firing mechanism housing. The squib body includes a metallic seal separating a firing mechanism in the housing from a percussion primer in the squib body. The primary feature of the metallic seal is that it prevents missile motor pressure from producing a path for gases to flow back through the entire assembly. The metallic seal is dented by the firing mechanism to activate the primer thereby permitting primer gases to ignite a charge of boron-potassium nitrate carried in the squib body, which in turn is used to initiate the motor ignitor.





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NONELECTRIC SQUIB ASSEMBLY

BACKGROUND OF THE INVENTION

This invention is related to the field of squibs and particularly to the use of nonelectric squibs for igniting missile vector motors. Missile vector motors are installed during missile assembly at the live bay area. Electroexplosive squibs installed in the vector motors have created hazards to operating personnel and property during the handling and transportation of these motors. One of the hazards associated with electroexplosive squibs for these motors is that stray RF and electrostatic energy may enter the system and prematurely ignite the motor.

SUMMARY OF THE INVENTION

The present invention provides a solution to this problem by providing a nonelectric squib which offers less hazard to operating personnel and property than the electric squib yet performs all the functions required of an electric squib. This performance is accomplished by a metallic seal that prevents missile motor pressure from producing a path for gases of flow back through the entire assembly. The seal also allows the use of a small charge to drive a firing pin to dent the seal and thereby initiate the squib. Final arming is performed external to the missile and late in the countdown thus reducing exposure of personnel to hazard.

This invention may be better understood from the following detailed description taken in conjunction with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

The single FIGURE shown in the drawing is a sectional perspective view of the nonelectric squib.

PREFERRED EMBODIMENT OF THE INVENTION

Reference numeral **1** indicates generally the nonelectric squib assembly. A firing mechanism housing **2** is shown in axial alignment with and attached at one end of a squib body **5** and houses a small booster charge (not shown). The firing mechanism is secured to the squib body to complete final arming of the missile. A shear pin **3** holds a piston-type firing pin **4** until the booster charge forces pin **4** thus shearing pin **3** and allowing pin **4** to slidably move forward. The firing pin has an operating contact point **4**: The squib body includes a first chamber **6** housing a percussion primer **7**. A seal **8** is in a thin disc made of metal, such as copper, and is attached in a position so that one side thereof is adjacent contact point **4'** and the opposite side of the seal closes off one end of chamber **6**.

This seal does not rupture when dented by contact point **4'** and thus provides a hermetic seal for the squib body. The seal also prevents missile motor pressure from producing a path for gases to flow back through the entire assembly. An inner disc **9** is made of aluminum foil and located at the opposite end of chamber **6** separating this chamber from one end of a second chamber **10**. The primer in chamber **6**, when activated, will emit gases that will rupture disc **9** and thereby enter chamber **10** which contains an igniter charge such as boron-potassium nitrate (B-KNO_3) identified by reference numeral **11**. A composite disc **12** at the opposite end of chamber **10** is a combination made up of a mica disc **13** and a mild steel disc **14**. After the igniter charge is ignited, composite disc **12** ruptures to allow the output of the igniter charge to initiate the motor ignitor.

In operation a detonation wave is transmitted to the booster charge in the firing mechanism housing, the charge ignites and drives the firing pin forward shearing the shear pin. The contact point of the firing pin dents the metallic seal to activate the percussion primer. After the primer has been activated the primer gases rupture the inner disc and the gases are emitted into the chamber containing the igniter charge such as boron-potassium nitrate which in turn is ignited. The output of the igniter charge ruptures the composite disc and is then used to initiate the motor igniter.

I claim:

1. A nonelectric squib assembly for igniting a missile motor and for preventing gas flowback through the assembly comprising: a squib body having a firing mechanism housing at one end thereof, a first chamber and a second chamber; a firing pin mounted for slidable movement within said squib body, said firing pin having a contact point on one end thereof; a shear pin connected between said squib body and said firing pin to restrain movement of said firing pin until squib operation is started; a metallic seal disposed between said contact point and one end of said first chamber for hermetically sealing the firing pin from gases flowing back when the missile motor is ignited; a percussion primer disposed in said first chamber adjacent said metallic seal; a rupturable inner disc of aluminum foil separating said first chamber from said second chamber and sensitive to gaseous pressures from said primer; a missile motor igniter charge disposed in said second chamber; and a composite disc consisting of mica and mild steel discs at the opposite end of said second chamber for separation of said squib ignition from the missile motor, whereby missile motor pressure is prevented from producing a path for motor gases to flow back through the entire squib assembly.