United States Patent [19]

Rentzsch et al.

[11] **3,862,601**

[45] **Jan. 28, 1975**

[54] **SAFETY DEVICE FOR EXPLOSIVE PROJECTILES**

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[22] Filed: **Jan. 30, 1973**

[21] Appl. No.: **328,126**

[30] **Foreign Application Priority Data**

Feb. 2, 1972 Germany 2204822

[52] **U.S. Cl.** **102/49.3**, 89/1.812

[51] **Int. Cl.** **F42b 15/10**

[58] **Field of Search** ..... 102/49.1, 49.3, 49.6, 49.7, 102/49.8, 70 R, 70.2, 70.2 AG; 89/1.812, 1.814

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[57] **ABSTRACT**

A projectile having a chamber containing a propellant charge with an electric igniter and also having a chamber containing an explosive charge with a time delay fuse. The chambers are separated by a wall in which there is a firing pin actuated by pressure from the propellant charge when ignited to start the time delay fuse. The projectile has a safety pin locking the firing pin in ineffective position and a wire is connected to the safety pin for withdrawal thereof to arm the projectile. The wire has a rest position on the outside of the projectile wherein it short circuits the circuit to the electric igniter for the propellant charge while preventing introduction of the projectile into a gun barrel prior to removal of the wire and safety pin from the projectile.

4 Claims, 2 Drawing Figures

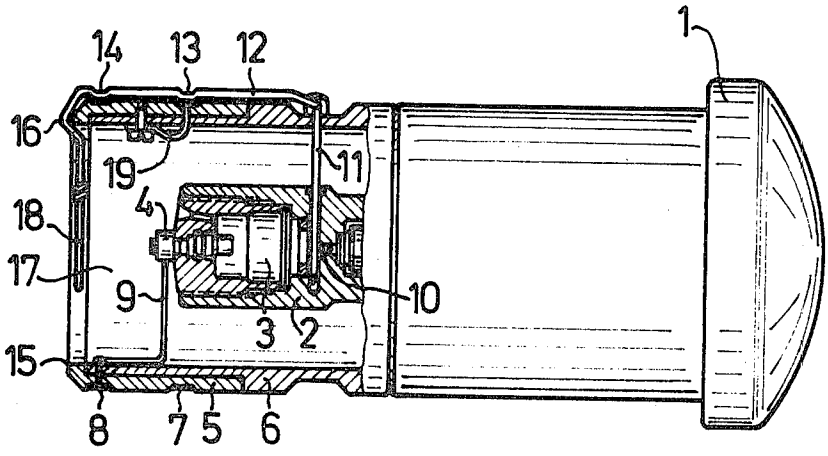


Fig. 1

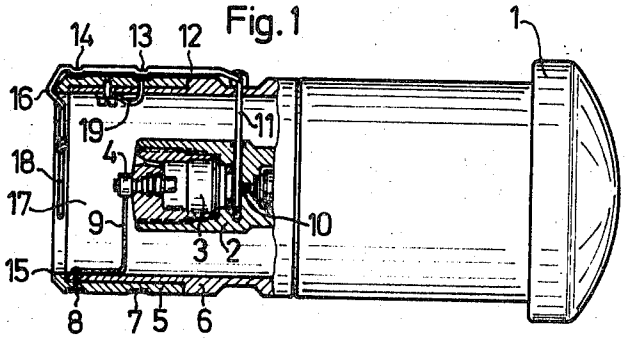
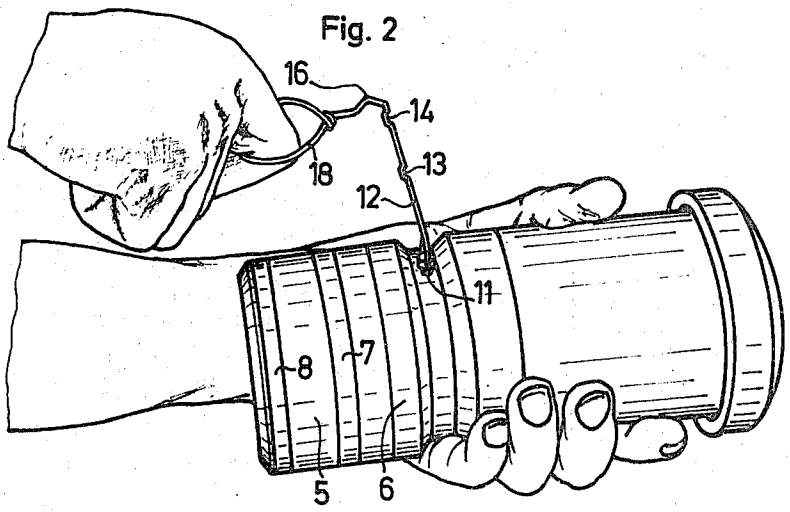


Fig. 2



SAFETY DEVICE FOR EXPLOSIVE PROJECTILES

The present invention relates to a safety device for explosive projectiles the propellant charge of which is adapted to be ignited electrically and the explosive charge of which is adapted to be initiated or exploded by the propellant charge by means of a delayed action fuse while between the propellant charge and an ignition transfer element there is provided a safety element in the form of a fuse safety pin which prior to the insertion of the projectile into the mortar tube is adapted to be manually removed and in its position of safety holds the ignition transfer element in its respective safety position.

A projectile of the general character referred to above has become known which is provided with an electrically ignitable propellant charge, according to which the ignition energy in the mortar tube is supplied from the outside through contact rings and ignites the propellant charge by means of an electric detonator. The ignition of the explosive charge provided in the splinter head of the projectile is effected from the propellant charge through a delayed action fuse which is adapted to be initiated or exploded by means of an ignition transfer element adapted to be axially displaced by the propellant charge. For deactivating, in other words for holding the ignition transfer element in its blocking position, there is employed a safety element designed as fuse safety pin which prior to the insertion of the projectile into the mortar tube is pulled out whereby the ignition transfer element designed as firing pin or striker becomes axially displaceable.

With a projectile of the above described type it is a requirement that, on the one hand, the projectile cannot be inserted into the mortar tube as long as the fuse safety pin is not pulled out which means as long as the ignition device for the explosive charge has not been activated. Furthermore it is necessary that in its condition for transport an ignition voltage cannot reach the detonator of the propellant charge by electric charges or in any other way.

It is an object of the present invention to provide a simple and safe safety device which will be easily removable and will meet the above requirements.

This object and other objects and advantages of the invention will appear more clearly from the following specification in connection with the accompanying drawing, in which:

FIG. 1 illustrates, partly in view and partly in section, a projectile with a safety device according to the invention.

FIG. 2 shows the activating procedure in connection with a projectile according to FIG. 1.

The safety device according to the present invention is characterized primarily by a wire element which is pivotally linked to the removable safety element and extends to the rear along the body of the projectile while being angled off inwardly at the rear edge of the projectile. This wire element is provided with cams within the region of contact rings or contact strips on the projectile body through which contact rings or contact strips ignition energy is conveyed from the outside to the electric propellant charge fuse. These cams rest on the contact rings or strips in a conductive manner.

The wire element may in the region of the rear edge or rim of the projectile body be provided with an arresting or holding nose or the like by means of which in its safety position it may be hooked onto the edge or rim of the projectile body. By means of the cams and the arresting engagement the wire element is held in a position approximately parallel to the outer wall of the projectile in such a way that the projectile cannot be inserted into the mortar tube as long as the wire safety element is in its blocking position. The inwardly directed cams of the wire element may electrically conductively and detachably be connected to the contact rings or contact strips by means of solder, conductive lacquer, conductive foil, or the like. The free end of the wire element which is directed toward the center of the projectile may be extended to form a ring or loop by means of which the wire element can be grasped by a finger and pulled out of its blocking position by detaching it from the edge or rim of the projectile and from the contact rings or contact strips.

Referring now to the drawing in detail, the projectile **1** illustrated in FIG. **1** has its head equipped with a splinter carrier as well as with an explosive charge for splitting open the spinter carrier. In the interior of the projectile there is provided a combustion chamber **2** for an expulsion propellant charge **3** which is adapted to be ignited by an electric detonator **4.** Two contact rings **7, 8** are injection molded into an insulating ring **5** of an intermediate cylindrical part **6** of the projectile **1.** The contact ring **8** is through a conductor **9** connected to the detonator **4,** whereas the other contact ring **7** is through a conductor **19** and the metallic housing of the projectile **1, 6** connected to the mass pole of the detonator **4.**

A safety element in the form of a fuse safety pin is provided between the propellant charge **3** and an axially displaceable firing pin **10** which is adapted by means of a non-illustrated delayed action fuse (known in connection with hand grenade fuses) to ignite the explosive charge when the propellant charge **3** drives the firing pin **10** forwardly. This safety element, when in its safety position, prevents the firing pin **10** from being axially displaced. For activating the projectile **1,** i.e., its propellant charge **3** and the explosive charge, the fuse safety pin **11** is pulled radially outwardly.

Pivotally linked to the safety pin **11** is a wire element **12** of electrically conductive material which extends to the rear along the outer wall of the projectile **1** and, more specifically, along the intermediate portion **6** of the projectile. The wire element **12** is within the region of the contact rings or strips **7, 8** provided with inwardly directed cams **13, 14** which conductively rest on the contact rings or strips **7, 8.** The cams **13, 14** are soldered to the contact rings or strips **7, 8** or are electrically conductively connected thereto by conductive lacquer, conductive foil, or the like. In the region of the rear edge **15** of the projectile **1, 6,** the wire element **12** is approximately rectangularly bent inwardly and forms a kind of nose **16** by means of which it hooks over the edge **15.** The wire element **12** then extends past the edge **15** and forms a loop which may be placed into a depression **17** provided at the rear end of the projectile **1, 6.**

For activating the projectile **1,** as will be evident from FIG. **2,** the soldier slips a finger through loop **18** and pulls the wire element **12** to the rear of the projectile and outwardly thereby pivoting it and disconnecting the cams **13, 14** from the contact rings **7, 8.** Subsequently, the wire element **12** is pulled radially out-

wardly thereby pulling the safety element **11** laterally outwardly out of the projectile **1, 6.** Only then will the soldier be able to insert the projectile **1** into the mortar tube.

As will be evident from the above, the safety device according to the present invention will with a minimum of parts guarantee an absolute safety of the projectile against electric ignition of the propellant charge when the projectile is being transported and prior to the insertion of the projectile into the mortar tube. At the same time, the safety device according to the present invention prevents an accidental insertion or firing of the projectile as long as the ignition transfer stroke from the propellant charge through the delayed action fuse to the explosive charge of the splinter carrier is blocked.

It is, of course, to be understood that the present invention is, by no means, limited to the particular showing in the drawing but also comprises any modifications within the scope of the appended claims.

What is claimed is:

1. In a projectile adapted to be introduced into the barrel of a weapon and having a propellant charge and a delayed-action fuse means for igniting an explosive charge, a transfer element movable by explosion of said propellant charge upon ignition to initiate operation of said fuse means, a safety pin in said projectile blocking movement of said transfer element by said explosion of said propellant charge and withdrawable for releasing said element, an electrically operable igniter energizable for igniting said propellant charge, a pair of contact members on the outer side of said projectile connected to energizing contacts of said igniter, and an electrically conductive short circuiting element lying along the outer side of said projectile engaging said contact members in electrically interengaging relation thereto to short circuit said energizing contacts, said short circuiting element being movable out of engagement with said contact members, and said short circuiting element being connected at one end to said safety pin so as to serve as a handle for the withdrawal thereof from locking position, said short circuiting element engaging said projectile to maintain it in engagement with said contact members.

2. In a projectile as claimed in claim **1,** said short circuiting element when engaged with said projectile lying on the outer periphery thereof and preventing insertion in a barrel of a weapon.

3. In a projectile as claimed in claim **2,** said short circuiting element resiliently engaging said projectile to maintain it in engagement with said contact members, and also including a manually graspable end for releasing said short circuiting element.

4. In a projectile as claimed in claim **1,** in which said contact members are a pair of contact rings on the periphery of the projectile, and the short circuiting element extends along the outer side of said projectile with a resilient nose releasably engaging over the end of said projectile, and said short circuiting element has two protrusions in engagement with said contact rings, said short circuiting element being hinged to said safety pin.

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