

[72] Inventor **Stanley S. Packer**
Palisades Park, N.J.
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 [73] Assignee **Simmonds Precision Products, Inc.**
Tarrytown, N.Y.

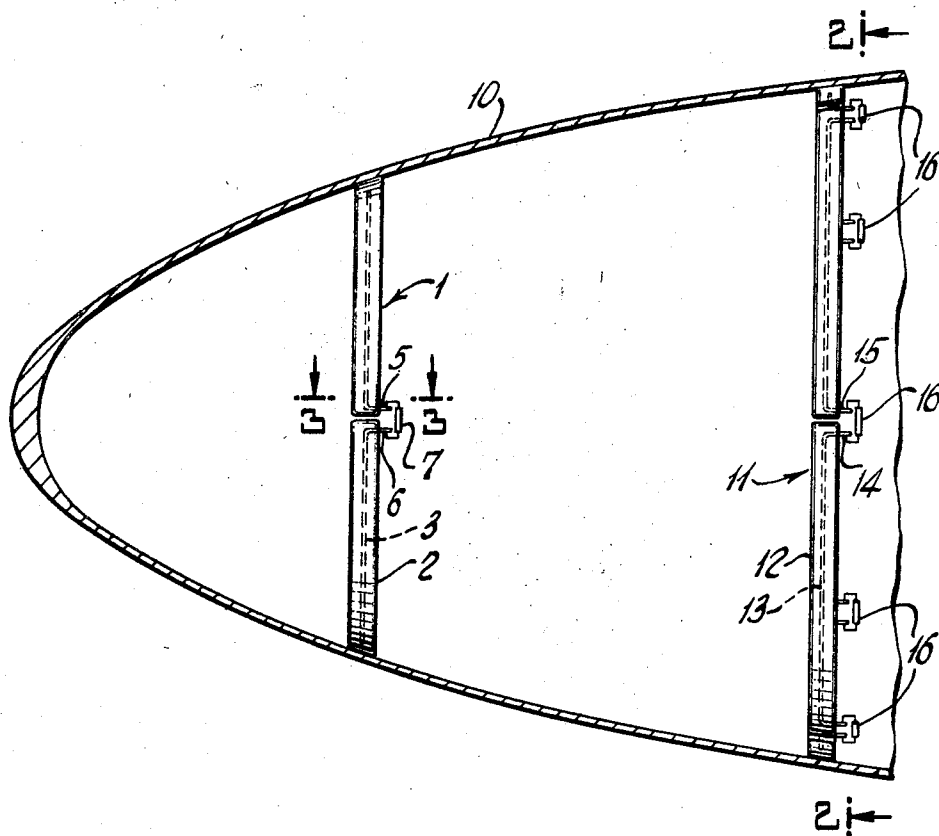
Primary Examiner—Samuel Feinberg
Assistant Examiner—Thomas H. Webb
Attorney—William V. Pesce

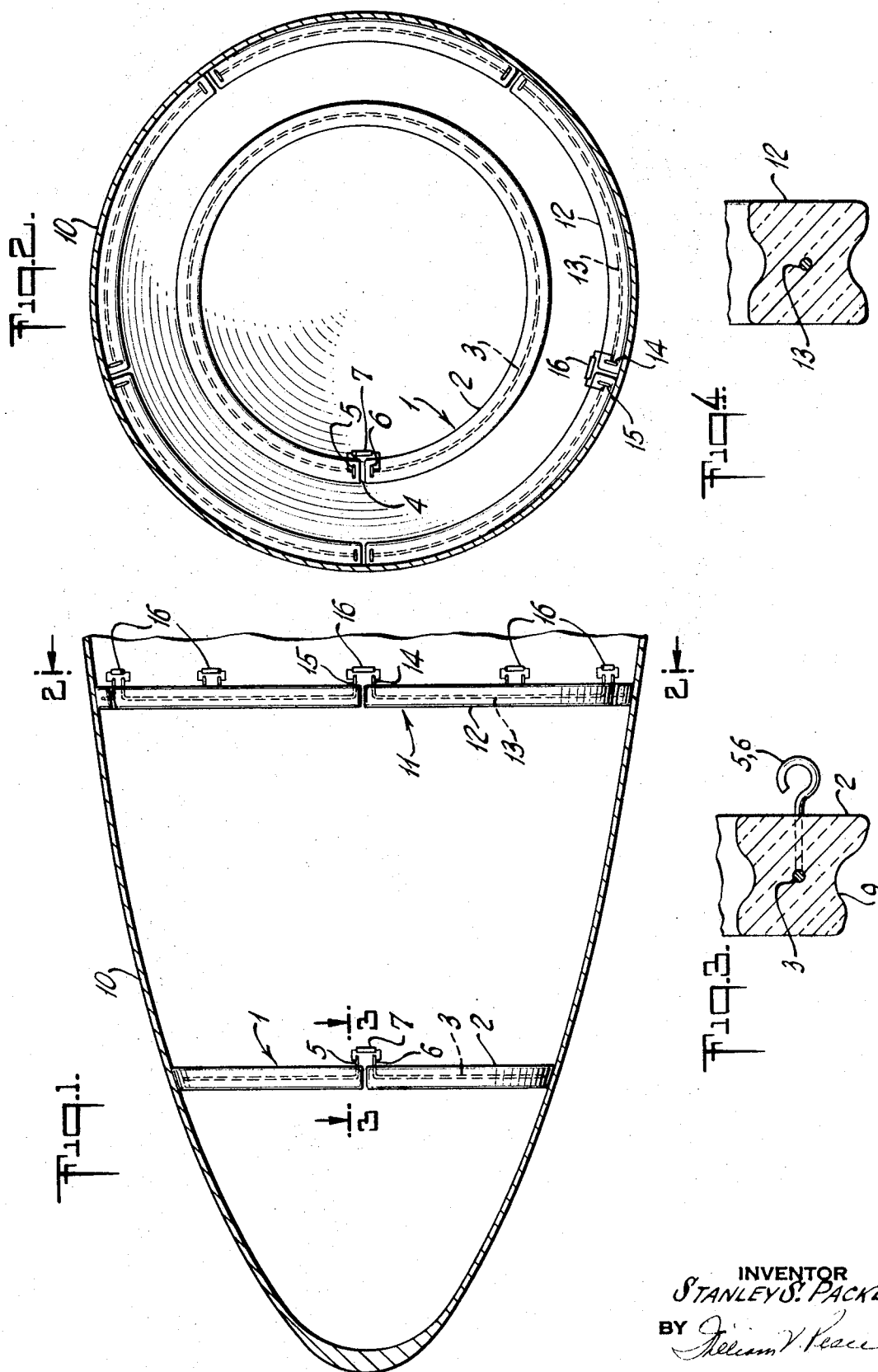
ABSTRACT: This invention relates to a delay-type fuse and in particular relates to a fuse disposed to rupture after a time lag from time of impact.

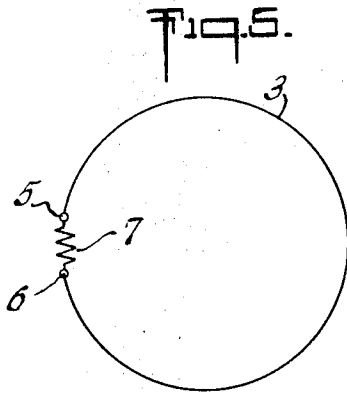
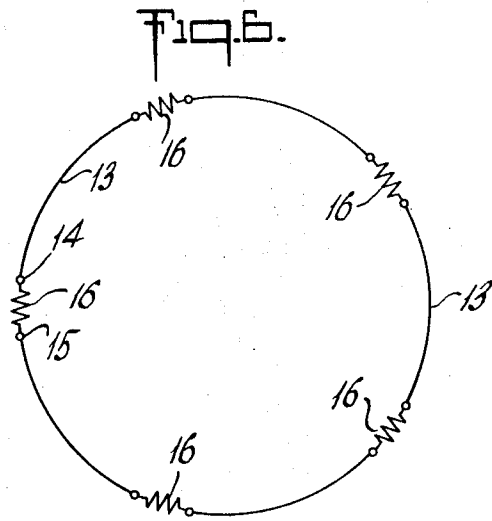
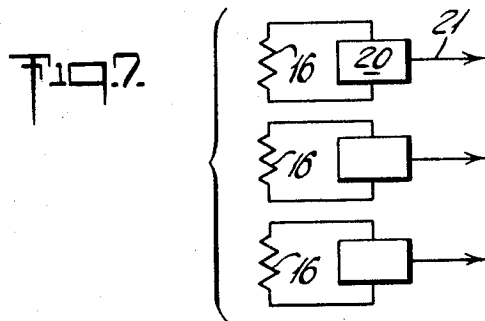
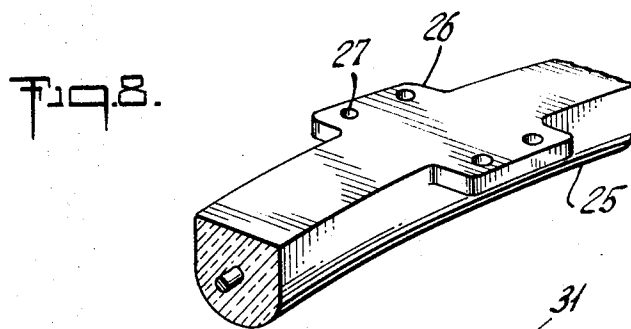
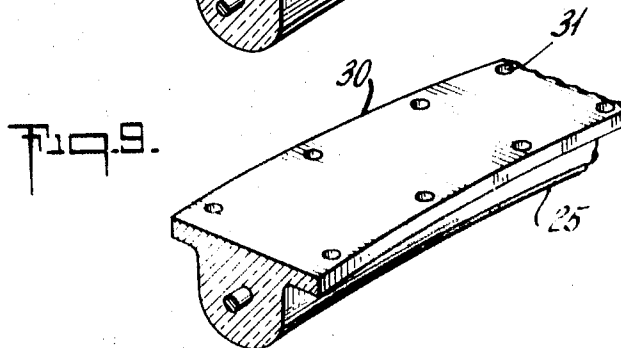
A missile cone housing having therein suitably mounted peripheral-type rings, segmented and/or continuous. Also, centrally disposed therein, similarly peripherally oriented, are conductive elements whose opposing extremities are attached via a resistive element so as to complete a current-carrying circuit. The said circuit is an integral part of a trigger device for triggering an explosive so that the interruption of said current flow creates the action for triggering said charge. The resistive element is disposed to break or otherwise dislodge itself from the peripheral ring upon impact of the cone with a target area, but only after the cone has extended itself to some degree of penetration against the said target or to the extent wherein the time it takes for the cone to become flattened or otherwise distorted after the said impact.

[54] **DELAY FUSE MECHANISM**
 4 Claims, 9 Drawing Figs.

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 244/1
 [51] Int. Cl. F42c 15/40,
 F42c 1/08, F42c 1/10
 [50] Field of Search 102/75, 76,
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INVENTOR
 STANLEY S. PACHER
 BY *Richard V. Packer*
 ATTORNEY

DELAY FUSE MECHANISM

In general, explosive-type missiles—be they bombs, shells, submarine torpedoes, and the like—will generally upon impact explode because the fuse, pin will on contact detonate the explosive charge residing within the missile and other explosive-carrying vehicles. The result from said contact explosion is not as effective as if the explosive charge were to penetrate further into the target area. Contact explosion permits the full force therefrom to be expended merely above the target surface. However, to be more effective the charge should be made to detonate directly on, or some distance, below the target area so that the full force and effect of the charge will be felt. To achieve this effect a special detonation-type fuse has been conceived wherein the charge is not exploded above the surface but that it takes place directly on, or slightly below, the surface. The fuse detonation is delayed a period of time after impact, the extent thereof being dependent upon the speed of the missile, the impact force on contact and the depth of penetration of said explosive-carrying vehicle.

It is therefore a principal object of the invention to provide a detonation-type fuse which delays the explosion of a charge to create a more effective hit.

Another object of the invention is to provide a detonation-type fuse which is simple, rugged, easy to manipulate and handle, inexpensive and highly reliable and accurate.

A still further object of the invention is to provide a detonation-type fuse which is readily adaptable to any explosive-carrying vehicle to permit the said vehicle the capability of having a greater effect on a target area after the impact thereof by the said vehicle.

Other objects and advantages will become apparent from a reading of the specifications and a study of the accompanying drawings, and wherein:

FIG. 1 shows an elevation in section of a nose-cone containing a detonation fuse for a missile device, mounted therein according to an embodiment of the invention.

FIG. 2 shows a section through the line 2-2 of FIG. 1.

FIG. 3 shows a section through the line 3-3 of FIG. 1.

FIG. 4 shows a section through the line 4-4 of FIG. 1.

FIG. 5 shows schematically the fuse configuration of FIG. 1 of a single split ring.

FIG. 6 shows schematically the fuse configuration of FIG. 1 of a multiple segmented ring.

FIG. 7 shows schematically circuitry for detonating a charge.

FIGS. 8 and 9 are ring-type cross sections having different configurations for the mounting thereof to a missile shell.

Now referring to the respective drawings and particularly to FIGS. 1 and 2, there is shown one embodiment of a delayed detonation-type fuse 1 in the form of a split ring 2 having centrally embedded therein and coextensive therewith a conductor 3. The ring itself may be made of a plastic material such as epoxy resin, alkyd resin and the like, the said material being capable of withstanding both high temperatures without softening and low temperatures without cracking. The plastic is generally considered a thermo-setting plastic which provides the above-stated capabilities.

The ring 2 is continuous to the split area at which point there is a small gap 4 which represents the terminal points 5 and 6 of the inner conductor 3. The terminals are extended axially of said ring so as to form a convenient location at which a resistive element 7 may be located. The resistive element 7 is shown symbolically, but it is to be appreciated that it represents an element in a circuit disposed to become inoperative and cause detonation when broken or otherwise dislocated from terminals 5 and 6.

The fuse ring 1 has a surface 9 beveled at the outer circumference as shown in FIG. 3 so as to permit the missile cone 10 to conveniently slide over and otherwise engage the ring to create a snug fit. This permits easy manipulation and mounting of ring to cone, thereby avoiding any damage to the fuse in the said mounting process.

When the missile cone impacts a surface area, a time lag ap-

pears between impact and an expansion of the cone circumference created by the impact. Expansion of the cone diameter causes expansion of the ring and the rupture of the resistive element above described. Breaking of the resistive element breaks the circuit and causes detonation and explosion. Also the initial impact imparts a delayed pressure movement between the missile cone nose and the after-part wherein the ring is mounted so that the delay permits the cone and charge residing therein to penetrate the target area further or at least get closer to the said area so that a greater effect will result from the explosive charge.

FIG. 1 further shows a segmented-type ring 11 having a plurality of ring segments 12 each having an internal conductor 13 with gap terminal points 14 and 15 as in the ring 1 previously described with a resistive element 16 tied therebetween at each gap where the terminal points are located. The segmented ring is constructed of the same or similar plastic compound as the single continuous ring with the same temperature and strength requirements.

FIGS. 5, 6 and 7 are schematic drawings showing the breakable resistive fuse elements 7 and 16 for the continuous and segmented rings and in particular the manner in which they may be connected to a circuit used for causing detonation. For example, in FIG. 7 the resistive element may be connected across a circuit 20 (symbolically shown as block 20) so that when resistive element 16 is disconnected a small charge, impulse or some signal indication 21 would be emitted to an explosive charge so as to ignite same. There are any number of ways to permit this, but the same is not shown for brevity.

FIGS. 9 and 10 are different type ring configurations to permit easy and reliable mounting of the ring to the missile cone. In particular, FIG. 8 shows a ring 25 having an outer periphery with spaced mounting bosses 26, including suitably spaced perforations or holes 27 for the mounting thereof to the shell of a missile. FIG. 9 has a continuous base 30 comparable to the base of FIG. 8 along the outer periphery of ring 25 but with continuous holes 31 equally spaced along said periphery for again mounting base to the missile shell.

Although what has been shown and described are continuous and segmented ring members for the purpose of creating delayed action fuse detonation, it is also possible to permit elongated elements to be mounted longitudinally on said cone with gaps between elements, as described in the above specifications, so that the delayed action of the destruction of the resistive elements between gap portions would create the same effect given by the ring members.

It may be appreciated that other changes in form and design may be made to the foregoing invention without changing its intent or scope.

What I claim is:

1. A delayed action control switch mechanism for a missile which impacts a target area comprising,
 - a. an elongated member including an internal conductor coextensive with and residing therein,
 - b. terminal means at the end of said conductors and defining a gap therebetween,
 - c. a resistive element connected to said terminals across said gap and disposed to rupture after a time lag from the time of said impact, and
 - d. means connected to said resistive element to cause the detonation of said explosive charge upon the rupture thereof.
2. A control switch mechanism according to claim 1 and wherein said elongated member is a single continuous ring and said terminal means include axially extended terminals for supporting said resistive elements.
3. A control switch mechanism according to claim 1 and wherein said elongated member includes a plurality of segmented members connected to form a single ring with gaps between said segmented parts.
4. A control switch mechanism according to claim 1 and wherein said elongated member is a plastic epoxy resin capable of withstanding high temperature without melting and low temperature without cracking.