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ADJUSTABLE DELAY TIMER FOR EXPLOSIVE DEVICE

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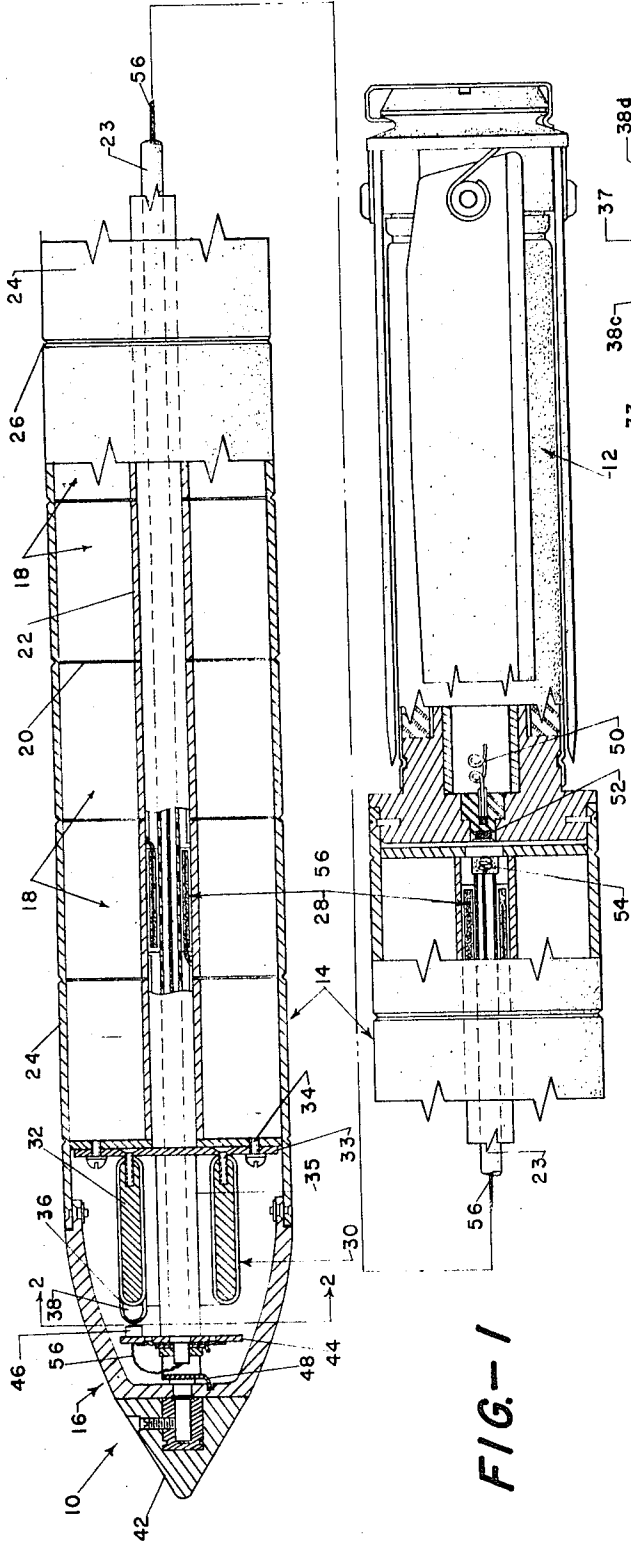


FIG-1

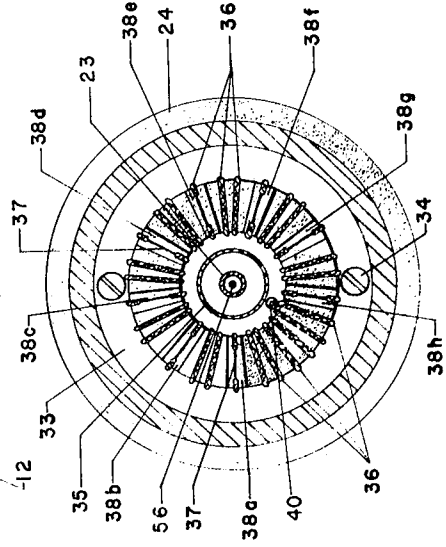


FIG-2

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**ADJUSTABLE DELAY TIMER FOR
 EXPLOSIVE DEVICE**

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8 Claims

ABSTRACT OF THE DISCLOSURE

An adjustable and variable timer for igniting an explosive charge, or the like, after a predetermined time interval which comprises a torus with a length of combustible fuse wound on the torus with the fuse exposed at various locations adjacent the edge thereof. A disc which is rotatably adjustable in relation to the torus is positioned adjacent the exposed portions of the wrapped fuse at a preselected length thereof to effect ignition through the disc position at a selected exposed portion of the fuse.

This invention relates to a variable delay timer for igniting an explosive train after a predetermined interval.

It is the general object of the present invention to provide a delay timer device used in association with armament and explosive charges for military or commercial use, which device is simple, inexpensive, and insensitive to shock, impact, and vibration.

For a better understanding of the invention, reference should be had to the accompanying drawing wherein:

FIG. 1 is a broken-away longitudinal cross section of a chaff dispensing rocket incorporating the delay timer device of the invention;

FIG. 2 is a transverse cross sectional view taken substantially along line 2—2 of FIG. 1.

Before a detailed description of the timer device which is shown in the accompanying drawings is begun, it should be understood that the timer device of the invention is suitable for use with all armament and explosive charges which require ignition thereof after a predetermined time interval. The timer device of the invention is particularly useful in association with a chaff dispensing rocket, however, and it has been so described and illustrated.

Referring to the drawings in greater detail, and with particular reference to FIG. 1, the numeral 10 generally illustrates a rocket for dispensing radar chaff or the like. The rocket 10 is substantially cylindrical in shape and it basically consists of a rocket motor 12, a payload portion 14, and a nose cone assembly 16.

The payload portion 14 contains a plurality of radar chaff packages or cartridges 18 which are positioned adjacent to each other in the payload portion 14 of the rocket and which are separated by a plurality of spacer means 20. The radar chaff contained within the cartridges 18 is precut to selected wavelengths so that when the chaff is dispensed from the rocket 10 it will effectively reflect radar waves of particular wavelengths. A chaff positioning tube 22 extends substantially the entire length of the payload portion 14 and extends through the approximate center of each individual chaff cartridge 18. The rocket 10 is provided with an outer shell or covering 24 adapted to help contain the chaff packages 18 within the payload portion of the rocket 10. Outer shell 24 has a plurality of annular grooves 26 about its peripheral surface, the purpose of such being to facilitate dispensing of the chaff contained within the chaff packages 18 as will be more fully explained hereinafter.

The radar chaff is dispensed from the payload portion 14 of the rocket 10 by placing individual burster charge means 28 in substantially the center of each chaff package. The burster charge means 28 are positioned along regularly spaced intervals of the chaff positioning tube 22 whereby ignition or deflagration thereof effectively explodes the individual chaff packages 18 and breaks away the adjacent portions of outer shell 24 whereby the chaff contained within the chaff packages is effectively dispensed. It is the purpose of the present invention to provide a delay timer for igniting consecutively and sequentially the burster charge means 28 so that each chaff package 18 is exploded at a time delayed interval from the chaff package adjacent thereto.

The objects of the invention are achieved by mounting a variable delay timer device, generally indicated by numeral 30, in the nose cone assembly 16. The variable delay timer device 30 basically consists of a torus 32 mounted and supported by a post 35 which is secured to a base plate 33 affixed to the forward end of the payload portion 14 of the rocket as by suitable screw means 34.

A selected length of combustible fuse or fuse means 36 is wound about the torus with certain portions of the fuse 36 being wrapped over and around laterally extending protrusions 38 of the torus means 32. Fig. 2 illustrates eight (8) such protrusions and for purposes of clarification and convenience such protrusions are labeled a-h consecutively in a clockwise direction. As is best illustrated by FIG. 2, a short length of the protective covering of the fuse 36 is removed from those portions of the fuse 36 which are wrapped over the individual protrusion 38 of the torus 32. The purpose of such arrangement is to provide exposed areas 37 of the fuse 36 which can be ignited to effect deflagration of the fuse 36. The fuse 36 cannot ignite except where uncovered. A hole 40 is provided in base plate 33 and one end of the fuse 36 passes therethrough and is connected in series with each of the burster charge means 28 positioned in chaff tube 22. The other end of fuse 36 is left unconnected and dead after being wrapped around protrusion 38h.

In order to selectively ignite one of the exposed portions 37 of the fuse 36, a rotatable timer knob means 42 is positioned on the forward end of the rocket 10. A disc means 44 rotatably journaled in the post 35 is operatively connected to the timer knob 42 and is adapted to rotate therewith. A timer igniter 46 is mounted to the disc means 44, as illustrated by FIG. 1, and the timer igniter 46 is made of a suitable combustible material and is adapted to be positioned in close proximity with and adjacent to one of the exposed portions 37 of the fuse 36 upon selective rotation of the timer knob 42. Upon ignition of the timer igniter 46, as will be explained hereinafter, the heat of the igniter 46 impinges on the specific adjacent exposed portion 37 of the fuse 36 resulting in deflagration thereof.

As the fuse 36 is ignited, for example, at exposed portion 37 on protrusion 38d, it will begin to burn in both directions around torus 32. It is of no consequence as the fuse burns in a clockwise direction or toward protrusion 38h since this end of the fuse is left unconnected. But as it burns in a counterclockwise direction or toward protrusion 38a it will eventually ignite the burster charge means 28 to effect consecutive explosion of the chaff packages 18.

As can be readily visualized by references to FIG. 2, if the timer knob 42 is rotated until the igniter 46 is positioned in close proximity with and adjacent to protrusion 38h, this will effect the longest delay before the burster charge means 28 are exploded since the fuse 36 must burn around the entire torus 32. But if the timer

knob is rotated until the igniter is positioned in close proximity with and adjacent to protrusion 38a, this will effect the shortest delay between ignition of the timer assembly and explosion of the burster charge means 28 since fuse 36 must burn around only a relatively small segment of the torus before effecting ignition of the burster charge means. Note in any event that the total time for burning of the fuse begins from its ignition by the propellant charge. One second timing increments are obtained when approximately one foot of fuse is wound between, for example, protrusions 38c and 38d, since the type of fuse utilized burns at a rate of approximately one foot per second. It should be understood, however, that the burn rate of a suitable fuse could be accurately determined so that the fuse lengths could be made specific to give precise time increments. Thus a time delay or difference of 8 seconds after ignition of fuse 36 can be obtained in exploding the first burster charge means 28 solely by selectively positioning the timer knob 42.

Suitable indicia (not shown) are provided on the timer knob 42 so that the precise delay required in firing the first burster charge 28 can be obtained. A suitable limit or retention spring 48 is utilized with timer knob 42 so that the knob can only be turned such a rotational distance as will correctly move the timer igniter 46 from one protrusion 38 to the protrusion 38 adjacent thereto.

In order to effect ignition of the timer igniter 46, a second fuse 50 is imbedded in the propellant of the rocket motor 12. Since the rocket motor casing must be solid in order to have proper propulsion, the fuse 50 leads into a small receptor charge 52 such as fulminate of mercury which sends a shock wave through the solid casing to ignite a second fuse receptor charge 54 again being made from a suitable shock sensitive explosive which ignites the fuse length 56 which extends through the tube 23 to the timer 16. Thus the ignition of the rocket motor 42 starts the entire timer system of the invention in operation.

It has been found that best results are obtained in the delayed timer of the invention when the fuses 36 and 50 consist of a fiberglass covered bi-metallic composite of essentially palladium and aluminum, such as Pyrofuze which is sold by the Pyrofuze Corporation of 121 South Columbus Avenue, Mt. Vernon, N.Y.

While in accordance with the patent statutes only one best known embodiment of the invention has been illustrated and described in detail, it is to be particularly understood that the invention is not limited there-to or thereby, but that the inventive scope is defined in the appended claims.

What is claimed is:

1. In combination, rocket means, a plurality of chaff packages contained in said rocket means, burster charge means positioned in substantially the center of each chaff package, torus mans mounted to said rocket means in the forward area thereof, a selected length of combustible fuse means wound on said torus, a short length of the protective covering of said fuse means being rmoved at a plurality of pre-determined locations, one end of said fuse means connecting in series with each burster charge means, rotatable timer knob means positioned on the forward end of said rocket means, disc means operatively connected to said timer knob means for rotation therewith, igniter means mounted to said disc means and adapted

to be positioned adjacent to an exposed portion of said fuse means upon selective rotation of said timer knob means, and

means for igniting said igniter means whereby the heat of said igniter means impinges on a preselected portion of said fuse means resulting in deflagration thereof and delayed sequential deflagration of each burster charge means, the delayed deflagration of the burster charge means effecting consecutive explosions of the chaff packages.

2. The combination according to claim 1 wherein said means for igniting said igniter means is a second fuse means imbedded in the propellant of the rocket means and connected to the igniter means.

3. The combination according to claim 1 and including chaff positioning tube means extending substantially the length of the rocket means, said burster charges being contained within said tube means.

4. The combination according to claim 1 and including spacer means positioned between each chaff package, the outer shell of said rocket means adjacent said spacer means being grooved about its peripheral surface to facilitate dispensing the chaff upon explosion of the burster charge means.

5. The combination according to claim 2 wherein both of said fuse means consist of a fiberglass covered bi-metallic composite of essentially palladium and aluminum.

6. The combination according to claim 1 wherein said torus has a plurality of laterally extending protrusions over which an exposed portion of said fuse means is wrapped, said igniter means being selectively positioned adjacent one of the exposed portions of said fuse means.

7. The combination according to claim 6 and including means to allow rotational movement of said timer knob means sequentially to the rotational distance between adjacent protrusions of said torus.

8. A variable delay timer for igniting an explosive train after a predetermined interval including torus means,

a selected length of combustible fuse means wound on said torus, a short length of the protective covering of said fuse means being removed at a plurality of predetermined locations, post means positioned in the center of the torus means, disc means rotatably journaled to the post means, igniter means mounted to said disc means and adapted to be positioned adjacent to an exposed portion of said fuse means upon selective rotation of said disc means, and

means for igniting said igniter means whereby the heat of said igniter means impinges on a preselected exposed portion of said fuse means resulting in deflagration of the fuse means.

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