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TIME FUSE

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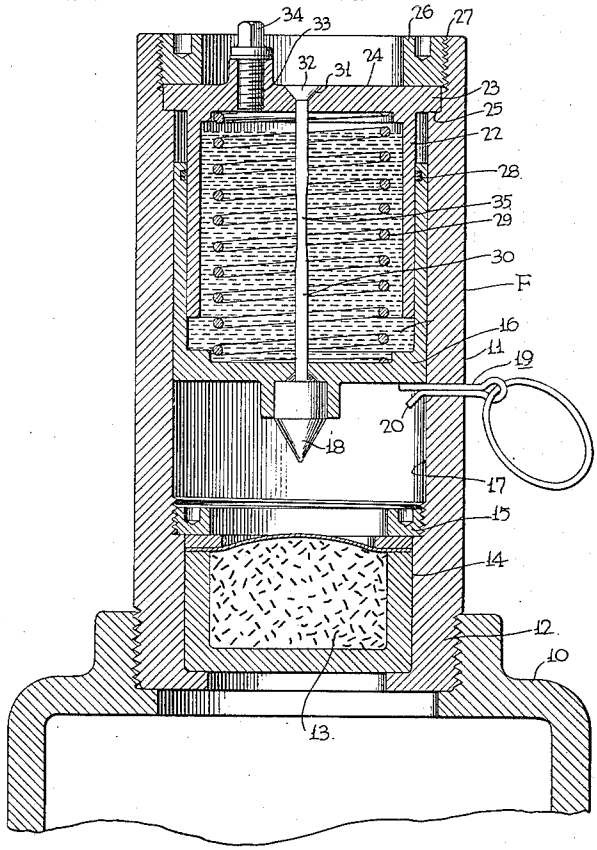

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TIME FUSE

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4 Claims. (Cl. 102—70)

This invention relates to a fuse for bombs and the like, more particularly to delayed action fuses.

The primary object of the present invention is to provide a fuse for a bomb such as used in aerial warfare which is so constructed and arranged as to explode the bomb at any desired interval after dropping of the bomb, such as for example, several minutes or even hours after impact, whereby a series of such bombs may be located in the path of a known advance of an enemy troop movement and set to explode upon the arrival of enemy troops at such locations, the approximate time of arrival of such troops having been predetermined through the use of observation planes or other sources of information.

A further object is to provide a delayed action bomb fuse of relatively simple construction which is efficient and extremely effective in operation.

With the above and other objects in view, the present invention consists in certain features of construction and combinations of parts to be hereinafter described with reference to the accompanying drawing, and then claimed.

Referring to the accompanying drawing which illustrates a suitable embodiment of the present invention, the numeral 10 designates the casing of a bomb to which the fuse is to be attached.

The fuse F comprises a cylindrical tubular casing 11 externally threaded at its one end 12 for threading attachment to the bomb casing 10, and having an internal radially inwardly extending shoulder at the end 12 which serves as a seat for the detonator 13.

The detonator 13 closely fits within a reduced bore 14 of the casing 11 and is securely locked in place by means of an annular externally threaded locking ring 15 threadably received within the fuse casing 11 to engage with the casing of the detonator 13 and clamp the same in position.

Arranged within the casing 11 is a cup 16 having a freely slidable fit with the bore 17 of the casing 11 and carrying an axial firing pin 18 capable of rupturing the end of the detonator 13, when released, to set off the detonator charge. The cup 16 is normally held against movement within the casing 11 by means of a safety pin 19 extending through the wall of the casing beneath the bottom of the cup 16 to serve as a stop. The safety pin 19 may be in the form of a cotter pin having one leg 20 bent as shown in the drawing to prevent inadvertent removal of the pin. The pin may be released or withdrawn by a ring 21 carried thereby.

The cup 16 surrounds an inner cup 22, inverted as shown in the drawing, and having a circumferential flange 23 at its upper or base end 24, which flange seats against a shoulder 25 formed at the upper or open end of the casing. The inner cup 22 is rigidly locked in coaxial relation with the casing 11 and inner cup 16 through the medium of an annular locking ring 26 threadably received at 27 at the open end of the casing 11, the locking ring securely engaging the upper face of the flange 23.

The outer cup 16 has a freely slidable yet precision fit with the fixed inner cup 22 to provide a fluid tight slidable connection therebetween. If desired, a suitable acid resistant packing 28 may be carried at the upper end of the cup 16 to engage the inner cup 22 to insure against fluid leakage.

Arranged within the two cups 16 and 22 is a coiled compression spring 29 which is normally under compression, that is, in the position shown in the drawing.

The firing pin 18 suitably carries an axially extending wire or strip 30 of metal, or other material capable of being attacked by acid, to be later described, which axially extends through the bottoms of the cups 16 and 22 and has its free end peened or upset into a conical recess 31 of the base of the cup 22 as indicated at 32 in the drawing. Any suitable means, however, may be employed for securing the wire 30 to the firing pin 18 and base 24 of the cup 22. The wire or strip 30 is of sufficient strength to overcome not only the compression of the spring 29 when the safety pin 19 is released but also to withstand the shock of the impact of the bomb without rupture.

The present invention contemplates the use of an acid contained in the space within cups 16 and 22 and which may be inserted into such space through a filler opening 33 in the base 24 of the fixed cup 22, the opening being closed by a suitable threaded closure plug 34.

The parts comprising the fuse assembly are extremely simple, requiring only the simplest of machining operations and hence can be rapidly produced in quantity production. The assembly operation also is relatively simple. The first step in the assembly operation is to insert the detonator 13 and thread the annular ring 15 within the casing 11 to lock the detonator in place, after which the safety pin 19 is inserted and the one leg 20 bent over to prevent inadvertent removal

of the safety pin. Next, the cup assembly comprising the cups 16 and 22, spring 29 and connecting wire 30, is positioned within the casing 11 and the locking ring 26 threaded into the open end of the casing 11 to lock the cup assembly in place. It is seen therefore that the assembly operation is extremely simple and can be carried out expeditiously, especially in the production of large quantities.

The wire or restraining member 30 is of such composition that it will be attacked by the acid contained within the cup space and eaten through before the acid can damage the cups themselves or the spring 22. While different sizes of wire 30 may be employed, wires of the same size or diameter may be utilized wherein they may be reduced in cross section as indicated at 35 to provide different timing. By having members 30 of different cross sections, bombs may be set to explode at many different times from a minute or two to any desired number of hours or days. It, of course, is to be understood that with the safety pin removed, upon rupture of the wire or restraining member 30 through being eaten away by the acid, the coiled compression spring 29 will drive the outer cup 22 with sufficient force to rupture the detonator casing and set off the detonator charge.

It, also, is to be understood that the selection of the wire material and the sizes thereof and the type of acid to be used is determined by comprehensive tests and experiments well known in the art. For example, tests will show that with a predetermined wire material and a selected acid, the period of time required for the acid to rupture the wire in question can be readily determined. The assembled bombs, of course, are marked with any desired code marking to show the time required from the filling of the fuse cup space with the acid for the bombs to explode. The acid is not inserted until immediately prior to the loading of the bombs on the bombing planes, so in ascertaining the particular bombs to be used the loaders take into account the time which will elapse between the acid insertion and release of the bombs on their destructive flight. Provision may be made for withdrawal of the safety pins 19 just prior to their release from the plane carrying the same.

One marked advantage of the bomb fuse of the present invention is that a delayed action fuse of the character described is entirely noiseless and does not advertise that a seemingly harmless bomb is a time bomb. Another advantage is that a series of bombs which will explode at different times after dropping will have a demoralizing effect on the corps of men charged with the removal and destruction of unexploded bombs, for it never will be known at what second the bombs will explode.

It is to be understood that various changes may be made in detailed construction and arrangement of parts without departing from the spirit and substance of the present invention, the scope of which is defined by the appended claims.

What is claimed is:

1. In a time fuse, a firing mechanism comprising a pair of cup-shaped members having open ends in telescoped sliding engagement and closed ends spaced apart to provide a fluidtight acid containing chamber, an erodable restraining member within said chamber for holding the closed ends of said members in predetermined spaced relation, one of said closed ends carrying an externally located firing pin, and a compression spring normally compressed between said members, said chamber being adapted to contain an acid of a strength sufficient to destroy the effectiveness of said restraining member in holding said members against movement away from each other through the expansion pressure of said spring.

2. In a time fuse, a firing mechanism comprising a pair of cup-shaped members having open ends in telescoped sliding engagement and closed ends spaced apart to provide a fluidtight acid containing chamber, an erodable restraining member within said chamber for holding the closed ends of said members in predetermined spaced relation, one of said closed ends carrying an externally located firing pin, and a compression spring normally compressed between said members, said chamber being adapted to contain an acid of a strength sufficient to destroy the effectiveness of said restraining member in holding said members against movement away from each other through the expansion pressure of said spring, said restraining member having a portion of reduced predetermined cross-sectional dimension.

3. In a time fuse, a firing mechanism comprising a pair of cup-shaped members having open ends in telescoped sliding engagement and closed ends spaced apart to provide a fluidtight acid containing chamber, an erodable restraining member within said chamber for holding the closed ends of said members in predetermined spaced relation, one of said closed ends carrying an externally located firing pin, and a compression spring normally compressed between said members, said chamber being adapted to contain an acid of a strength sufficient to destroy the effectiveness of said restraining member in holding said members against movement away from each other through the expansion pressure of said spring and a support, the cup-shaped firing-pin-carrying member being movable relative to said support and the other cup-shaped member being rigidly secured to said support.

4. In a fuse device, a tubular casing, a detonator fixed within one end of said casing, a firing mechanism disposed within the opposite end of said casing, said mechanism embodying an extensible chambered member having relatively axially movable head portions, a firing pin fixed to one of said head portions, an erodable restraining element within the chamber of said member and connected with and normally restraining said head portions against relative movement away from each other and a compression spring within said chamber in end engagement with said head portions, said spring normally being held compressed by the restrained head portions, said mechanism being insertable as a unitary structure into said opposite end of said casing, and means for rigidly securing the other head portion to said casing, said chamber being adapted to contain an acid of a strength sufficient to attack and render, after a predetermined time period, said restraining element ineffective to restrain said head portions against relative movement away from each other, whereby said spring propels said one head portion and firing pin axially towards said detonator.

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