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H. M. BRAYTON

POWDER TIME FUSE

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Fig. 1.

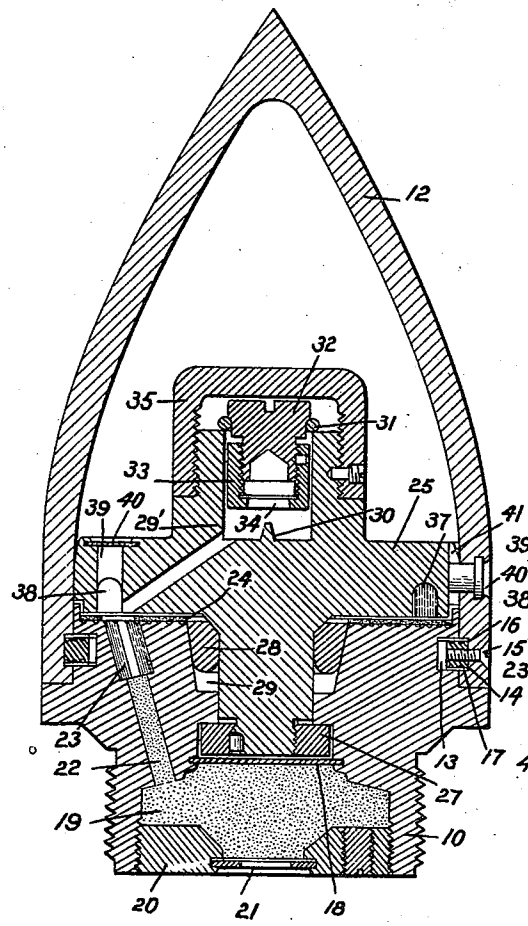
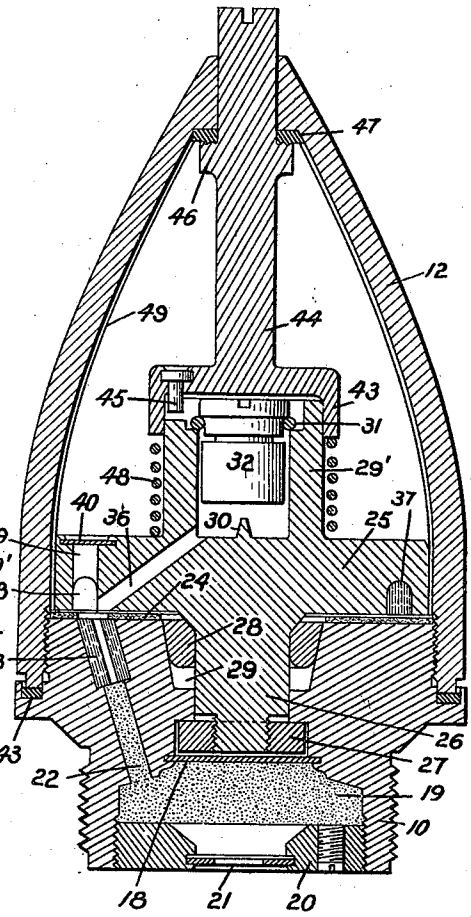


Fig. 2.



INVENTOR

Harold M. Brayton

BY W. M. Roach

ATTORNEY

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HAROLD M. BRAYTON, OF DOVER, NEW JERSEY.

POWDER TIME FUSE.

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(GRANTED UNDER THE PROVISIONS OF THE ACT OF MARCH 3, 1883, 22 STAT. L., 625.)

The invention described herein, may be manufactured and used by or for the Government for governmental purposes without the payment to me of any royalty thereon.

The subject of this invention is a powder time fuse.

In high angle firing against aircraft the variation in atmospheric pressure is a determining factor in regulating the venting of the gases generated by the burning powder of the time train. As the external pressure is reduced, the gases are vented at a more rapid rate, thereby reducing the internal pressure in the fuse and allowing the powder of the time train to burn more rapidly. On account of the variations in atmospheric pressure and the irregularity of the combustion of the powder time train, it follows that a fuse which is designed and set to explode a projectile after the lapse of a predetermined interval of time can at best be merely an approximation.

In addition, by virtue of the rapidity of combustion of the powder train and the limitation of the length of the train, due to the size of the fuse, it has generally been considered essential to provide two time rings.

According to the present invention, the fuse or cover is designed to confine within itself all of the gases generated by the burning powder train, thus creating uniform conditions within the fuse regardless of atmospheric pressure. The internal pressure within the fuse will be a constantly rising quantity and will consequently provide for slower combustion of the powder train, thereby permitting reduction to but a single ring to obtain the burning time required in a fuse of this character.

Other equally important objects and advantages are: to provide a powder time fuse including a novel means for obtaining gas obturation without interferring with the rapid setting of the fuse; to construct the setting mechanism so that the tendency to obturate will become greater as the internal pressure is increased; to provide a simple device operable on setback for locking the time ring in set position; to secure the fuse casing in rigid assembly; and, to include a heat insulating lining for minimizing the effect of changes in temperature.

To these and other ends, my invention consists in the construction, arrangement, and combination of elements, described hereinafter and pointed out in the claims forming a part of this specification.

A practical embodiment of my invention is illustrated in the accompanying drawings, in which,

Fig. 1 is a longitudinal sectional view of my improved fuse; and

Fig. 2 is a similar view illustrating an alternate method of carrying out the invention.

Referring to the drawings by numerals of reference:

According to the invention, I provide a suitable fuse casing comprising a body 10, formed with an annular flange 11, on which is seated a hollow fuse head or cover 12. The body is formed with a groove 13 in which is placed a split ring 14 prior to assembling of the casing. When the cover is in position, the split ring is expanded by means of machine screws 15 to partially engage a registering groove 16, on the inside of the cover and thereby serves to hold the cover in place.

The upper and lower surfaces of the ring are coated with a soft and elastic material 17, such as felt, soft solder, or rubber to effectually seal the joint.

The body is formed with a succession of connected irregular bores extending centrally thereof from front to rear and divided by the insertion of a disc 18 which is crimped into place.

To the rear of the disc 18 is a booster charge 19, confined by a base plug 20, which is centrally apertured to receive a covered disc 21, for preventing escape of the booster charge. A passage 22, loaded with a combustible material which may be a portion of the booster charge, extends to a powder pellet 23, which is disposed in a recess in the forward face of the body adjacent its periphery. The base plug 20 may be provided with a filling hole and the hole suitably closed by a threaded pin after assembly.

The forward face of the body is covered by a felt washer 24, on which is seated a time ring 25, formed with a stem 26, the free end of which is threaded for the reception of a nut 27 assembled from the rear and adapted to rotatably hold the time ring to the body. Embracing the stem 26 is

a tapered locking ring 28, disposed in a rearwardly converging cavity 29. When linear acceleration occurs in the bore of the gun, the locking ring 28 becomes firmly wedged between the stem and the body to securely hold the time ring in set position during flight.

Formed on the opposite face of the time ring and projecting into the hollow cover 12, is a tubular extension 29′, and in the bottom of the well thus formed is a fixed firing pin 30. A concussion plunger assembly held in safe position at the mouth of the extension by a resistance ring 31 comprises a plug 32, a primer carrier 33 and a primer 34. A cap 35, threaded and locked to the extension, prevents displacement of the plunger assembly.

A flash duct 36 leads from the base of the extension 29′ to a powder time train 37 disposed in an annular groove 38 in the under face of the time ring. A vent 39, closed by a rupturable disc 40, leads from the groove 38 into the hollow cover and enables all the gases generated by the burning powder train to pass to and be confined within the space in the cover. Pressure within the cover will be constantly rising regardless of the atmospheric pressure on the exterior of the fuse and the powder in the time train will be consumed under conditions which are uniform for all fuses.

When the powder time train is completely consumed, the flame passes to the pellet 23 and thence to the booster charge 19 in the base of the fuse.

The fuse is set by rotating the cover 12, which through a pin 40′, communicates its movement to an extension 41 on the time ring and thus the ring may be turned to any desired setting.

In the modified form illustrated in Figure 2 the cover 12 is threaded to the body 10 and seats on a ring 42 of any resilient substance which is provided for effectually sealing the joint.

A cap 43, slidably embracing the tubular extension 29′, is formed with a stem 44, which protrudes through the nose of the fuse and is adapted through a pin 45 to engage in a slot of the extension to rotate the time ring to any desired setting.

The setting stem 44 is formed with an annular flange 46 which is embedded in a washer 47 of any suitable elastic material positioned at the apex of the pressure chamber in the cover of the fuse.

A spring 48, embracing the tubular extension 29′ and abutting the rim of the cap 43, holds the flange of the setting stem firmly against the washer, while the increase in the pressure within the cover acting on the stem also tends to effectually seal the opening and obturate the gases.

However instead of threadedly connecting the body and the cover of the fuse they may be joined in a manner identically to that shown in Fig. 1, in which case, if desired, the setting stem 44 may be rigid with the cover.

A lining 49 of a suitable heat insulating material such as asbestos, may be held in place in the fuse cover by the time ring 25 for the purpose of minimizing the effect of changes in atmospheric temperature as the projectile mounts to higher altitudes.

While in the foregoing there has been illustrated and described, such combination and arrangement of elements as constitute the preferred embodiment of my invention, it is nevertheless desired to emphasize the fact that interpretation of the invention should only be conclusive when made in the light of the subjoined claims.

I claim:

1. A powder time fuse including a body, a hollow cover secured to the body, a time ring formed with a stem for rotatably securing the ring to the body, a tapered ring embracing the stem and adapted on set back to lock the time ring, a tubular extension formed on the forward face of the time ring, a concussion plunger supported at the mouth of the extension, and a cap for preventing displacement of the plunger.

2. A fuse including a body, a hollow cover for the body, a rotatable time ring carried by the body, a powder train in said ring, a tubular extension formed on the time ring and projecting into the cover, a firing mechanism carried within the extension, a capped stem mounted on the extension and protruding through the nose of the cover, a connection between the stem and the time ring whereby they may be rotated in unison to set the fuse, a flange formed on the stem, a resilient washer interposed between the flange and the cover, and a tension element for holding the flange against the washer.

3. A fuse including a body, a hollow cover for the body, a rotatable time ring carried by the body, a tubular extension formed on the time ring, a firing mechanism carried by the extension, a capped stem mounted on the extension and protruding through the nose of the fuse, a connection between the stem and the time ring whereby they may be rotated in unison to set the fuse, and means for sealing the joint between the stem and the cover.

4. A fuse including a body, a hollow cover for the body, a rotatable time ring carried by the body, a tubular extension formed on the time ring, a firing mechanism carried by the extension, a capped stem mounted on the extension and protruding through the nose of the cover, and a connection between the stem and the time ring whereby they may be rotated in unison to set the fuse.

5. A powder time fuse including a body, a hollow cover secured to the body, a time ring, said ring formed with a stem for rotatably securing the ring to the body, a ring embracing the stem and adapted on set back to lock the time ring, said time ring being further formed with a tubular extension projecting into the hollow cover and adapted to carry a firing mechanism.

6. A powder time fuse including a casing, a time ring, said ring formed with a stem for rotatably securing the ring to the casing, and a firing mechanism carried on the opposite side of the time ring.

7. A fuse including a body, said body formed with a rearwardly converging cavity, a time ring, a stem formed on the time ring for rotatably securing said ring to the body, and a tapered locking ring embracing the stem and disposed in the cavity, said ring being adapted on set back to be wedged between the stem and the body to lock the time ring in set position.

8. A fuse including a body, a time ring carried by the body, a powder train in said ring, means for igniting the powder train, a hollow cover for the body adapted to hold the gases of the powder train when consumed, and a stem protruding through the nose of the cover for setting the time ring, said stem having a greater tendency to obturate the gases as pressure in the cover increases.

9. An obturated powder time fuse including a rotatable and longitudinally movable setting stem, said stem having a greater tendency to obturate gases as pressure in the fuse increases.

10. A powder train time fuse including a casing, a single time ring carried by the casing, and a firing mechanism mounted axially in the time ring.

11. A powder train time fuse including a casing, a time ring rotatably carried thereby, and an axially disposed setting stem connected with said ring.

HAROLD M. BRAYTON.