March 19, 1946. F. T. CHRISTIAN 2,396,987

MECHANICAL TIME FUSE

Filed Feb. 9, 1940

Fig. 3

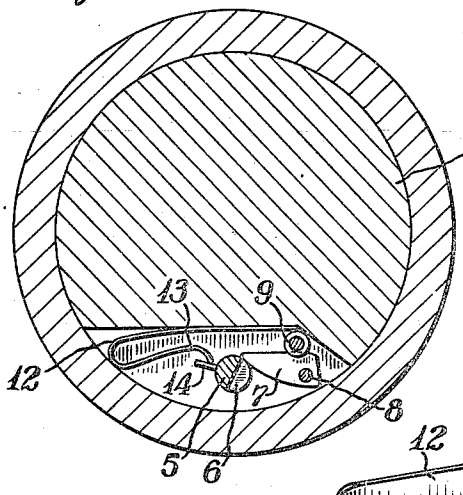
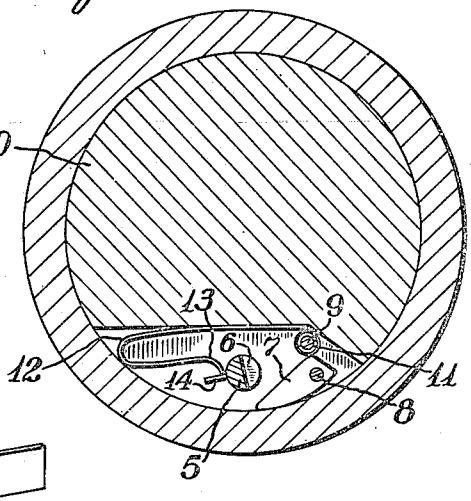


Fig. 4



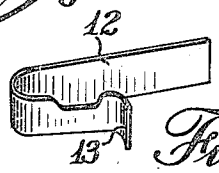


Fig. 5

Fig. 1

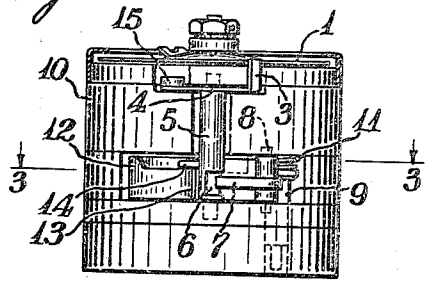
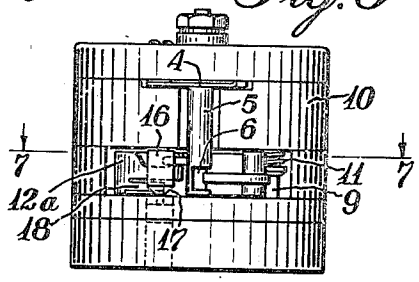


Fig. 6



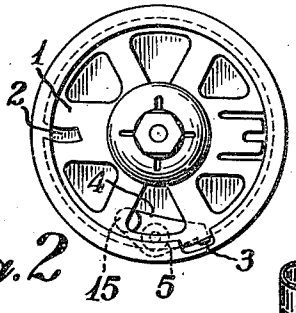


Fig. 2

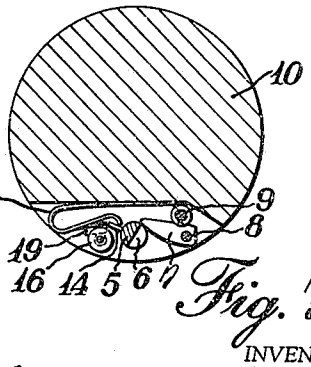


Fig. 7

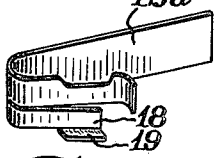


Fig. 8

INVENTOR.

Witness:
Burr W. Jones

BY Frank T. Christian
Clinton L. James

ATTORNEY.

Patented Mar. 19, 1946

2,396,987

UNITED STATES PATENT OFFICE

2,396,987

MECHANICAL TIME FUSE

Frank T. Christian, Elmira, N. Y., assignor to Bendix Aviation Corporation, South Bend, Ind., a corporation of Delaware

Application February 9, 1940, Serial No. 318,125

2 Claims. (Cl. 102—84)

The present invention relates to a mechanical time fuse for projectiles and more particularly to improvements for insuring the release of the firing pin at the proper time either under service conditions or during static tests of the fuse.

In mechanical time fuses as now constructed, it is customary to provide a firing pin for exploding a detonating cap, which pin is held in retracted position by a trigger or detent, the release of which is controlled by a timing mechanism.

The timing mechanism as usually constructed includes a pivotal latch having a lug bearing on the periphery of a rotatable timing disc and adapted to enter a notch in the disc when in registry therewith, the lug being counterbalanced by a weighted projection on the latch movable by centrifugal force in a direction to cause the lug to enter the notch. Since the friction of the lug on the timing disc tends to impair the accuracy of the chronometric mechanism, it is desirable to keep the counterbalance weight as low as possible consistent with reliable operation of the latch. Moreover, it is desirable to subject fuses to various forms of static tests in which centrifugal force is absent.

It is an object of the present invention to provide a mechanical time fuse incorporating a novel device for assuring the operation thereof irrespective of the effects of centrifugal force.

It is another object to provide such a device incorporating a rotary latch which is counterbalanced as respects centrifugal force, with means for continuously biasing the latch toward released position irrespective of centrifugal effects.

It is another object to provide such a device having spring means for effecting release of the latch.

It is another object to provide such a device incorporating a lock for preventing release of the latch, with yielding means for holding said lock in operative position.

It is another object to provide such a device in which the spring releasing means for the latch serves also as the yielding holding means for the lock.

Further objects and advantages will be apparent from the following description taken in connection with the accompanying drawing in which:

Fig. 1 is a side elevation of a fuse mechanism incorporating a preferred embodiment of the present invention;

Fig. 2 is a top plan view thereof;

Fig. 3 is a sectional view of the fuse mechanism in a shell, the section being taken substantially on the line 3—3 of Fig. 1;

Fig. 4 is a view similar to Fig. 3 showing the parts in released position;

Fig. 5 is a detail in perspective of the latch operating spring;

Fig. 6 is a view similar to Fig. 1 of a second embodiment of the invention;

Fig. 7 is a section taken substantially on the line 7—7 of Fig. 6; and

Fig. 8 is a detail in perspective of the latch spring of the second embodiment of the invention.

In Figs. 1 and 2 of the drawing there is illustrated a known form of fuse having timing disc 1 adapted to be rotated by any suitable form of clockwork, not illustrated, in order to bring a notch 2 into registry with a lug 3 on a latch lever 4 journalled in the fuse frame 10. Axle 5 of latch 4 is provided with a milled section 6 arranged to accommodate the free end of a detent 7 pivoted at 8 in the frame. Detent 7, as best seen in Fig. 3, is arranged to hold a firing pin 9 in retracted position against the action of a firing pin spring 11 (Fig. 1) so long as the latch 4 is maintained in locking position as illustrated in Figs. 1, 2 and 3.

According to the present invention, means are provided for insuring rotation of the latch 4 in a direction to release the firing pin detent 7 as soon as the lug 3 of the latch comes into registry with the notch 2 in the timing disc 1. As here shown, this means is in the form of a spring member 12 of suitable elastic material seated in the frame 10 and having a free end 13 adapted to bear against a pin 14 fixed in the axle 5 of the latch 4 to thereby constantly urge the latch in a direction to release the detent 7.

A weight 15 is provided on the latch 4 to act as a counterbalance for the lug 3. This weight is preferably arranged to slightly overbalance the latch so that centrifugal force tends to move it to releasing position. The spring 12 may then be made only sufficiently stiff to secure reliable operation of the latch in a static condition, centrifugal force during dynamic testing or in service being prevented from adversely affecting the operation of the device.

In operation, the parts of the fuse when set occupy the positions illustrated in Figs. 1, 2 and 3, the distance of the notch 2 from the lug 3 being the measure of the timing of the fuse. When the timing disc 1 is rotated by the clockwork to bring the notch 2 into registry with the lug 3, the spring 12 is permitted to expand, rotating the axle 5 of

the latch into position where the milled section 6 is presented to the end of the detent 7. The detent is thus freed for rotation on its pivot 8 to the position illustrated in Fig. 4, thereby releasing the firing pin in the usual manner.

In Figs. 6, 7 and 8 an embodiment of the invention is illustrated in which a safety lock for the latch 4 is provided, which lock is also controlled by the latch-releasing spring 12*a*. As here illustrated, a locking plunger 16 is slidably mounted in the frame 10 of the fuse and is normally positioned as shown in Fig. 6 where it engages the pin 14 of the latch 4 to positively prevent rotation of the latch in a releasing direction. The plunger 16 is provided with a tapered portion 17, and latch spring 12*a* is provided with a tongue 18 having a projection 19 arranged to engage the tapered portion 17 and yieldingly maintain the plunger in its locking position.

When the projectile containing the fuse is discharged, or the fuse is subjected to a comparable longitudinal acceleration, the plunger 16 is set back by its inertia out of locking position against the resistance of the tongue 18 of spring 12*a*, whereupon the operation of the fuse may take place as described in connection with the first embodiment of the invention.

Although certain embodiments of the invention have been shown and described in detail, it will be understood that other embodiments are possible and various changes may be made in the design and dimensions of the parts without departing from the spirit of the invention as defined in the claims appended hereto.

What is claimed is:

1. In a mechanical time fuse for projectiles, a firing pin, spring actuating means therefor, a detent for the firing pin, a pivoted latch for the detent having a lateral projection, a safety lock for the latch normally engaging said projection and slidable out of locking position, and a spring having a portion cooperating with said projection to urge the latch toward releasing position and having another portion cooperating with the lock to retain it in operative position.

2. In a mechanical time fuse for projectiles, a firing pin, a pivotal trigger for holding the pin in inoperative position, a rotary latch for the trigger having a lateral projection, a slidable lock for said latch cooperating with said projection, and a spring having two arms, one arm opposing movement of the lock out of locking position and the other arm cooperating with said projection to urge the latch toward released position.

FRANK T. CHRISTIAN.