

Dec. 7, 1937.

M. L. MATHSEN

2,101,082

FUSE

Filed June 4, 1935

3 Sheets-Sheet 1

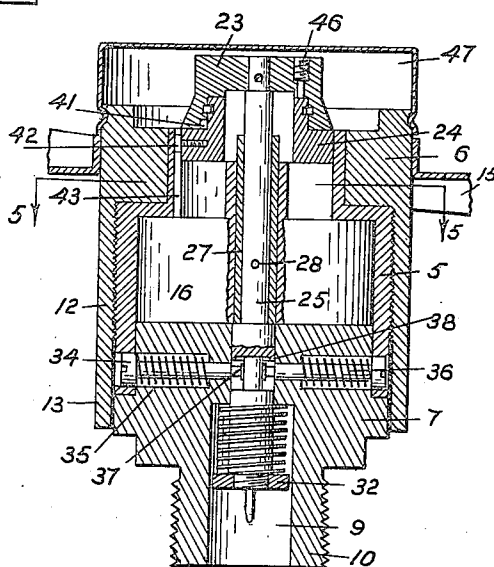
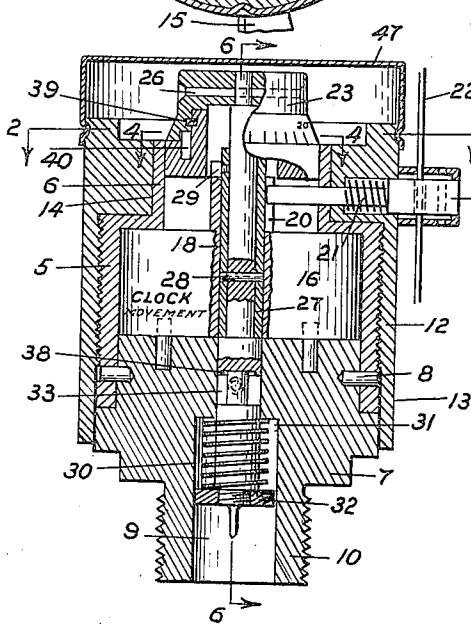
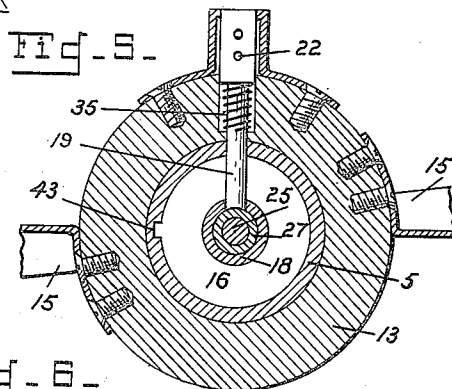
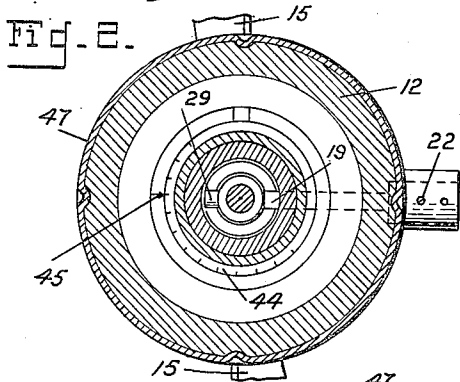
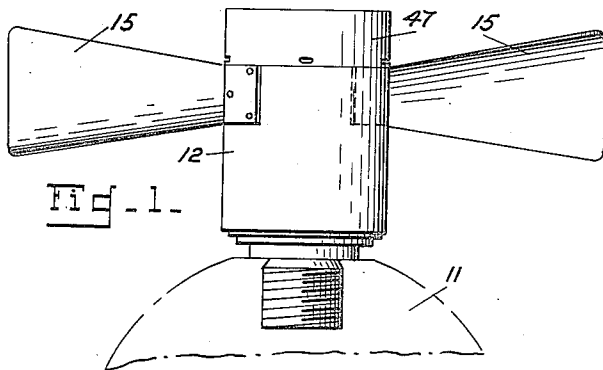


Fig. 3

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Fig. 7.

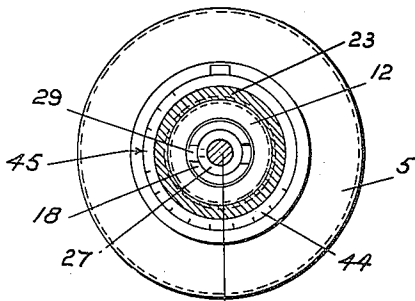


Fig. 9.

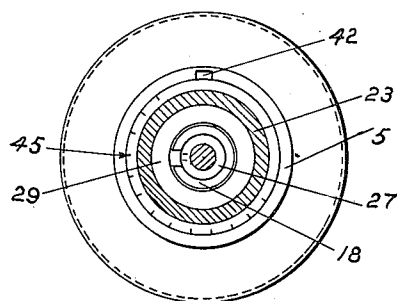


Fig. 8.

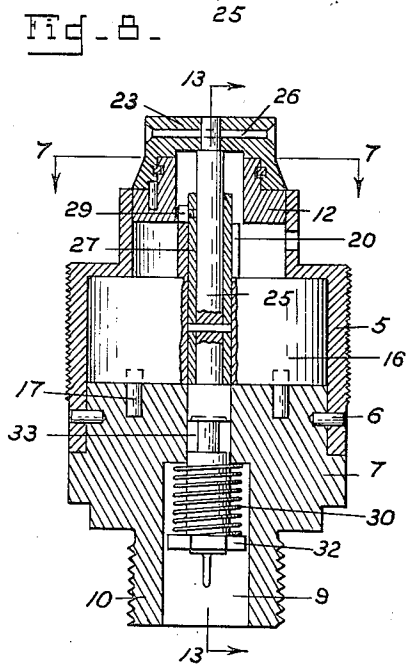
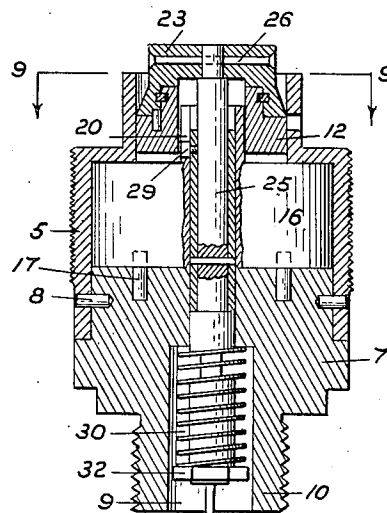


Fig. 10.



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Fig. 11

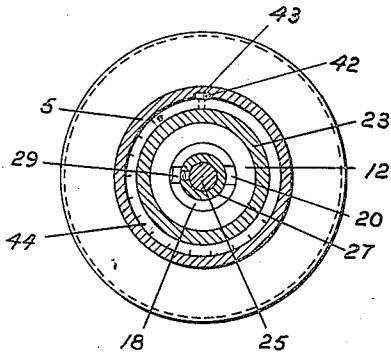


Fig. 12

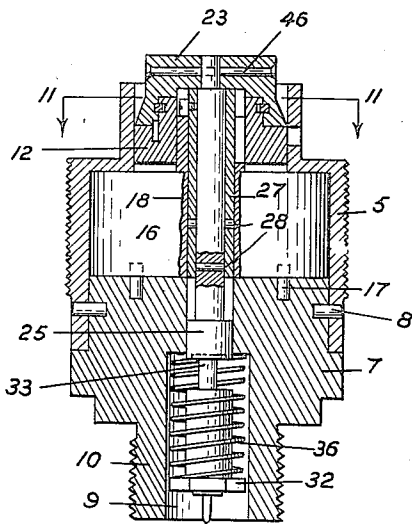


Fig. 13

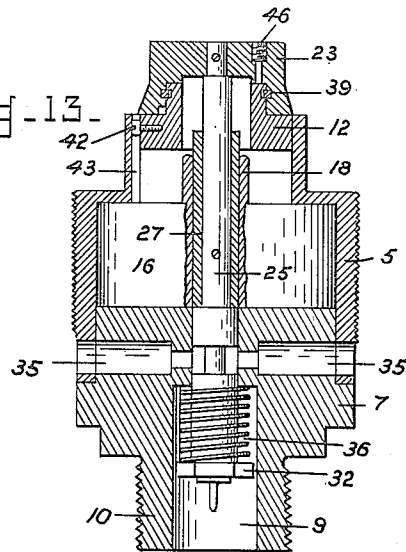
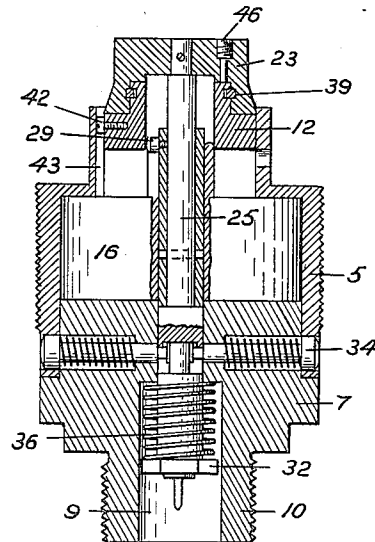


Fig. 14



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UNITED STATES PATENT OFFICE

2,101,082

FUSE

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Application June 4, 1935, Serial No. 24,881

10 Claims. (Cl. 102—37)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

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.

5 The subject of this invention is a fuse.

The purpose of the invention is to provide a mechanical time fuse capable of functioning on impact which will be simple in construction, and which will consist of relatively few parts and be of light weight.

10 The invention is characterized by a striker which extends axially of the fuse and through a clockwork mechanism. The striker is arranged to function if impact occurs before expiration of the time for which the clock-work mechanism is set to function, and it is also arranged to be held in a safe position if the clock-work mechanism, due to failure, functions immediately upon being released. The starting of the clock-work mechanism and the arming of the fuse is controlled in a simple and novel manner.

15 To these and other ends, the 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 the invention is illustrated in the accompanying drawings, wherein:

20 Fig. 1 is a view in side elevation of the improved fuse.

Fig. 2 is a sectional view taken on the line 2—2 of Fig. 3.

Fig. 3 is a longitudinal sectional view with the parts in safe position.

25 Fig. 4 is a sectional view on the line 4—4 of Fig. 3.

Fig. 5 is a sectional view on the line 5—5 of Fig. 6.

30 Fig. 6 is a sectional view on the line 6—6 of Fig. 3.

Fig. 7 is a sectional view on the line 7—7 of Fig. 8.

Fig. 8 is a longitudinal sectional view with the parts in armed position.

35 Fig. 9 is a sectional view on the line 9—9 of Fig. 10.

Fig. 10 is a longitudinal sectional view with the parts in time-functioning position.

40 Fig. 11 is a sectional view on the line 11—11 of Fig. 12.

Fig. 12 is a longitudinal sectional view with the parts in impact-firing position.

45 Fig. 13 is a sectional view on the line 13—13 of Fig. 8.

Fig. 14 is a similar view with the parts in malfunctioning position.

Referring to the drawings by characters of reference the fuse comprises a chambered body 5 having a reduced neck 6 at its front end and having its rear end closed by a base 7 which is fixed in place by pins 8. The base is provided with a central counterbored passage 9 and has a threaded stem 10 whereby the fuse is attached to the nose of a bomb 11. A sleeve 12 threaded on the body has a skirt 13 extending almost to the rear end of the base and it also has an internal collar 14 adapted to embrace the neck 6. The sleeve is provided with vanes 15 which function by air pressure during flight of the bomb to unscrew the sleeve from the body.

The body 5 houses a timing unit 16 which is a conventional clock-work mechanism and is positioned by dowels 17 fixed in the base 7. The timing unit includes a central tube 18 which extends into the neck 6 and is adapted to be rotated when the timing unit is in operation. The tube 18 and the sleeve 12 are held against rotational movement by an arming pin 19 which passes through the sleeve 12 and the neck 6 of the body and has its inner end disposed in a longitudinally extending slot 20 in the tube 18. The arming pin is held against the action of a spring 21 normally tending to eject it from the fuse by means of a wire 22 passing through the pin and a part of the sleeve. The wire is withdrawn during launching of the bomb as is well understood in the art.

A striker disposed axially of the fuse and extending therethrough consists of a cap 23, a locking ring 24 on which the cap is rotatably mounted, and a firing pin 25 secured to the cap by a pin 26. A sleeve 27 embracing the firing pin and detachably connected thereto by a shear pin 28 carries a laterally projecting timing pin 29 at its forward end. This pin 29, when engaging the brim of the tube 18 of the timing unit, holds the striker in place against the action of a spring 30 which is disposed in the counterbored passage 9 of the base and is confined between the shoulder 31 of the base and a nut 32 on the inner or rear end of the firing pin.

The portion of the firing pin that is normally disposed in the base is provided with an annular groove 33 adapted to receive the inner ends of a plurality of similar and oppositely arranged locking bolts 34 mounted in a transverse passage 35 in the base. The bolts are ejected from the base to free the firing pin by means of springs 36 when the skirt 13 of the sleeve 12 has been re-

moved. The inner end of each bolt is formed with an annular groove 37 adapted under certain circumstances, as will be explained herein-after, to receive an annular lip 38 on the firing pin.

The cap 23 is rotatably held in place on the locking ring 24 by means of a split ring 39 which is inserted in aligned grooves in these members. The amount of rotation of the cap is limited by a pin 40 which is fixed in the locking ring 24 and has a projecting end disposed in an arcuate slot 41 in the cap 23. The base of the locking ring 24 is disposed in the mouth of the neck 6 and has a pin 42 riding in a longitudinally extending slot 43 in the inner wall of the neck and thereby holding the locking ring against rotational displacement, while permitting axial movement of the striker. The cap is inscribed with a scale 44 of seconds of time readable against a fixed index or reference mark 45 on the rim of the neck 6. The cap, when set, is locked against movement relative to the locking ring by means of a set screw 46.

A cover 47 is snapped on the front end of the sleeve 12 and serves to protect the fuse against the entry of foreign matter. It is removed when the fuse is to be set and it is then replaced.

The parts of the fuse are in the safe position when arranged as in Figs. 1 to 6. The arming wire 22 holds the bolt 19 in place to prevent operation of the timing unit 16 and to maintain the slot 20 in a predetermined position. The striker is held in its forward position by means of the timing pin 29 which rests on the brim of the tube 18 and has a predetermined angular relation with respect to the slot 20 according to its setting. In the relation shown the fuse is set for 11 seconds.

When the bomb is launched the arming wire 22 is withdrawn and the bolt 19 is ejected by its spring 21 to permit operation of the timing unit and unscrewing of the sleeve 12 due to the action of air pressure on the vanes 15. As soon as the skirt 13 of the sleeve clears the bolts 34 they are ejected by the springs 36 and no longer are in the path of movement of the firing pin. The tube 18 with the slot 20 has commenced to rotate and the fuse is in the armed position shown in Figs. 7, 8 and 13.

After 11 seconds of flight the tube 18 has rotated and positioned its slot 20 in line with the timing pin 29 so that, as shown in Fig. 10, the spring 30 may drive the striker rearwardly and cause the firing pin to function a primer (not shown).

If the bomb strikes an object before the expiration of the time for which the fuse is set, the striker is driven rearwardly (Fig. 12), shearing the pin 28 from the sleeve 27 which carries the pin 29.

Referring to Fig. 14, if the timing unit due to failure of its mechanism functions instantaneously as soon as the bolt 19 is removed, and presents its slot 20 to the pin 29, then the striker will be driven rearwardly by its spring 30 until arrested by the bolts 34. In this instance the lip 38 of the firing pin engages the groove 37 of each of the bolts 34 to positively hold the bolts 34 in place even after the skirt 13 clears them during removal of the arming sleeve 12. In view of this arrangement the fuse cannot function directly underneath the aircraft from which it was launched and it will land as a dud unless the impact shears the inner ends of the bolts 34 and thereby frees the firing pin.

The bolt 19 which holds the tube 18 and the arming sleeve 12 against rotation is also in the path of movement of the locking ring 24 of the striker and thereby serves as an additional safety means to prevent premature functioning of the striker.

I claim:—

1. In a fuse, a casing having a neck and a centrally apertured base, an arming sleeve threaded on the outer side of the casing, vanes on the sleeve, a timing unit within the casing and having a rotatable tube extending into the neck of the casing and provided with a slot, a releasable bolt for holding the arming sleeve and tube against rotation, a striker including a locking ring slidably and non-rotatably mounted in the neck of the casing, a cap rotatably mounted on the locking ring, a firing pin fixed to the cap and extending through the timing unit and into the apertured base, a firing pin spring, spring-pressed bolts in the casing and retained by the arming sleeve in the path of the striker, a sleeve on the firing pin, a shear pin connecting the sleeve and firing pin, and a pin on the sleeve engaging the brim of the tube and adapted to enter the slot therein.

2. In a fuse, a casing, an arming sleeve on the casing removable during flight, a timing unit within the casing and having a rotatable tube provided with a slot, a releasable bolt for holding the arming sleeve and tube against rotation, a rotatably adjustable striker extending through the timing unit, a spring for driving the striker, a sleeve on the striker, a shear pin connecting the sleeve and striker, a pin on the sleeve engaging the brim of the tube and adapted to enter the slot therein, and means normally held in the path of the striker by the arming sleeve.

3. In a fuse, a casing, an arming sleeve on the casing removable during flight, a timing unit within the casing and having a rotatable tube provided with a slot, a releasable bolt for holding the arming sleeve and tube against rotation, a rotatably adjustable striker extending through the timing unit, a spring for driving the striker, a sleeve on the striker, a shear pin connecting the sleeve and striker, a pin on the sleeve engaging the brim of the tube and adapted to enter the slot therein.

4. In a fuse, a casing, an arming sleeve on the casing removable during flight, a timing unit within the casing and having a rotatable member, a striker mounted for movement longitudinally of the casing, a releasable bolt passing through the arming sleeve and casing, said bolt disposed in the path of movement of the striker and holding the rotatable member of the timing unit against movement.

5. In a fuse, a casing, an arming sleeve threaded on the casing and removable during flight, a timing unit within the casing and having a rotatable member provided with a slot, a releasable bolt passing through the arming sleeve and casing and inserted in the slot of the rotatable member, and a member movable into the slot of the rotatable member after a predetermined movement thereof.

6. In a fuse, a casing, an arming sleeve threaded on the casing and removable during flight, a timing unit within the casing and having a rotatable member provided with a slot, a releasable bolt passing through the arming sleeve and casing and inserted in the slot of the rotatable member.

7. In a fuse, a casing, an arming sleeve on the casing and removable during flight, a timing unit

within the casing and having a rotatable member, and a releasable bolt passing through the casing and arming sleeve and holding the rotatable member against movement.

5 8. In a fuse, a casing, a timing unit within the casing and having a rotatable tube disposed axially of the fuse and provided with a slot, a rotatably adjustable impact striker extending through the axially disposed tube of the timing
10 unit and projecting in front of the casing, a spring for driving the striker, a sleeve on the striker, a shear pin connecting the sleeve and striker, and a pin on the sleeve engaging the
15 brim of the tube and adapted to enter the slot therein.

9. In a fuse, a casing, a timing unit within the casing and having a rotatable tube disposed axially of the fuse and provided with a slot, a ro-

tatably adjustable impact striker extending through the axially disposed tube of the timing unit and projecting in front of the casing, a spring for driving the striker, and means on the striker engaging the brim of the tube and adapted to enter the slot therein. 5

10. In a fuse, a casing, a timing unit in the casing including a driven member provided with an opening, an impact striker extending through the driven member and projecting in front of the casing, a spring for moving the striker, a holding
10 member on the striker for engaging the driven member to restrain the striker against its spring, said holding member positionable with respect to the opening in the driven member of the timing
15 unit to provide timed release of the striker when the opening is presented to the holding member.

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