

March 8, 1932.

J. M. KING

1,848,355

COMBINATION FUSE

Filed Nov. 12, 1930

2 Sheets-Sheet 1

FIG. 2-

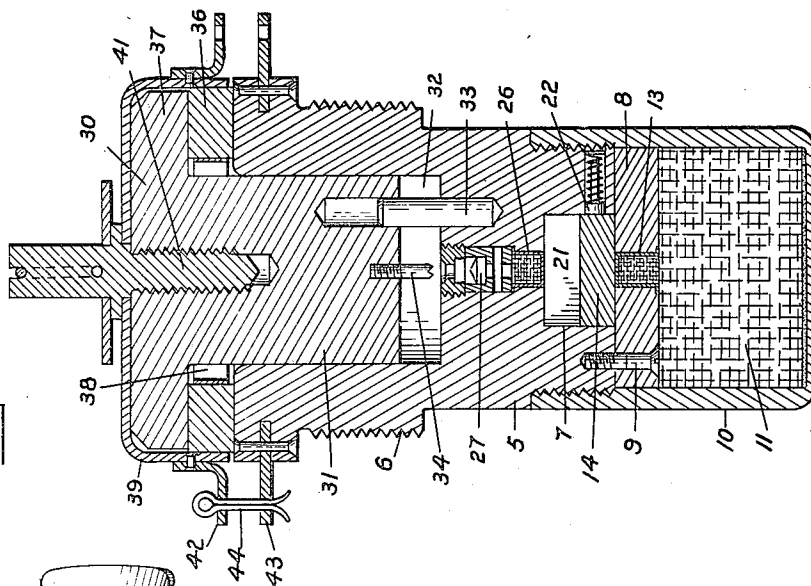
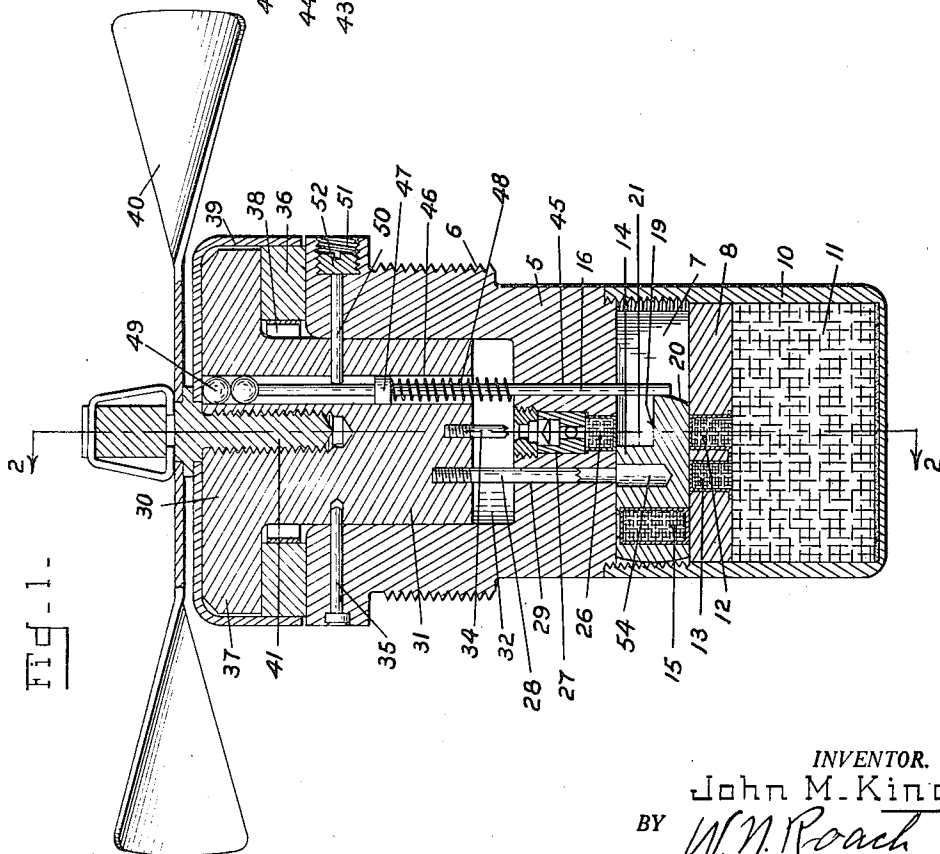


FIG. 1-



INVENTOR.
John M. King
BY *W. N. Roach*
ATTORNEY

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2 Sheets-Sheet 2

Fig. 3.

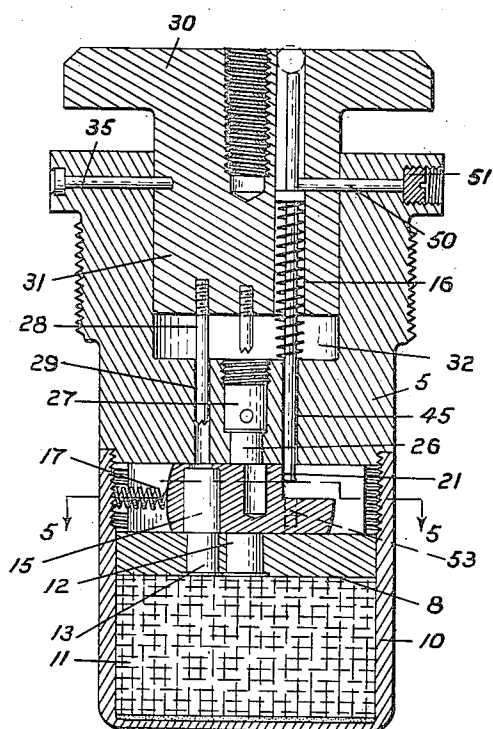


Fig. 4.

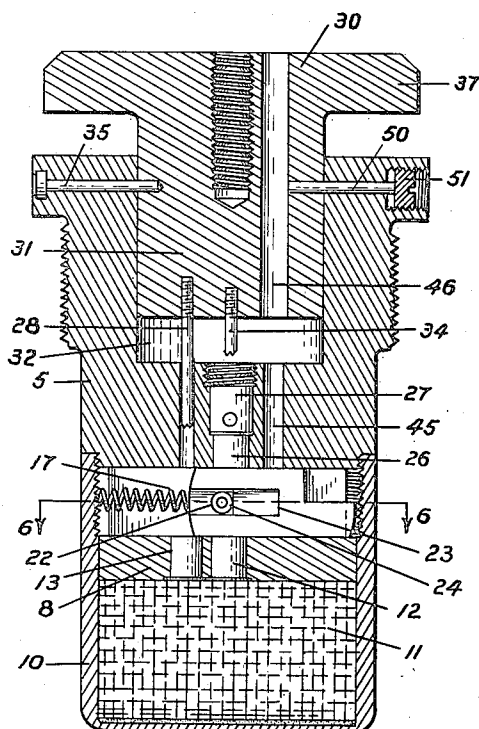


Fig. 5.

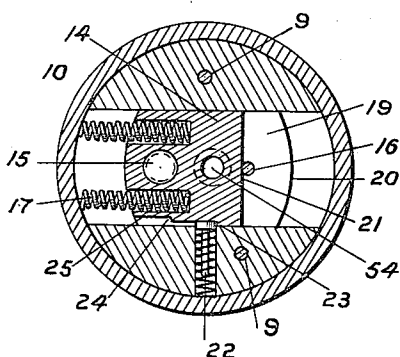
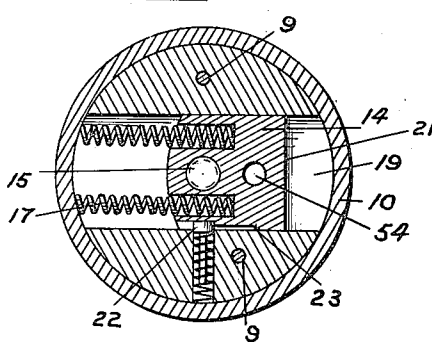


Fig. 6.



INVENTOR.
John M. King
BY *W. N. Roach*
ATTORNEY

UNITED STATES PATENT OFFICE

JOHN M. KING, OF DOVER, NEW JERSEY

COMBINATION FUSE

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(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 combination fuse, especially designed as a nose fuse for drop bombs but not restricted thereto.

10 The principal object of the invention is the provision of a fuse having a plurality of interrupted detonating trains which may be selectively brought into communication by operation of a setting pin to provide for either instantaneous or delay action.

15 With the foregoing and other objects in view, the invention resides in the novel arrangement and combination of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed may be made within the scope of what is claimed without departing from the spirit of the invention.

20 A practical embodiment of the invention is illustrated in the accompanying drawings, wherein:

25 Fig. 1 is a longitudinal sectional view of a fuse constructed in accordance with the invention and showing the parts in the safe or unarmed position;

30 Fig. 2 is a longitudinal sectional view taken at right angles to Fig. 1 on the line 2—2 of Fig. 1;

35 Fig. 3 is a longitudinal sectional view similar to Fig. 1 but showing the parts in the first armed position;

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

Fig. 5 is a sectional view on the line 5—5 of Fig. 3; and

40 Fig. 6 is a sectional view on the line 6—6 of Fig. 4.

Referring to the drawings by characters of reference:

45 The fuse comprises a body 5 having the usual threaded portion 6 whereby it is attached to a projectile. The lower portion of the body is provided with a transverse passage 7 closed at the bottom of a plate 8 held to the body by screws 9. A cap 10 threaded to the body carries a booster charge 11 which is

in communication with a pair of relay booster charges 12 and 13 in the plate 8, the charge 12 being axial of the fuse.

Mounted in the transverse passage 7 for slidable movement is a carrier 14 containing 55 a primer detonator 15. The carrier is normally held in the unarmed position by means of a rod 16 which is withdrawn during flight of the bomb, as will be described hereinafter. When the rod has been withdrawn, the carrier 14 is urged to armed position by springs 17—17. There are two armed positions for the carrier corresponding to alignment of the primer detonator 15 with the two relay booster charges 12 and 13, and dependent on 60 the partial or complete withdrawal of the rod 16.

The end 20 of the carrier 14 adjacent the rod 16 is stepped, the corner in the direction of movement of the rod 16, being the 70 right hand upper corner in the present instance, having been cut away as at 19 to provide spaced rod contacting faces 20 and 21 at different levels. In the unarmed position, the face 20 is engaged by the rod (Fig. 1) 75 and when the rod is partially withdrawn the carrier moves to the first armed position where it is held by engagement of its face 21 with the rod (Fig. 3). During movement of the carrier, it is guided by the plunger 22 which, by engaging the shoulders 23 and 24 of a stepped groove 25 (Figs. 5 and 6) 80 respectively holds the carrier in the first and second armed positions, preventing rebound against the action of the springs 17.

85 In the second armed position (Fig. 4) the primer detonator 15 is positioned axially of the fuse and is in alignment with a primer 26 and a delay train 27 carried axially by the body 5.

In the first armed position (Fig. 3) the primer detonator 15 is in alignment with a firing pin 28 disposed in a passage 29 in the body and carried by an impact plate 30 forming the nose of the fuse. The impact plate 95 includes a stem 31 mounted for sliding movement in a cavity 32 in the forward portion of the body 5 and guided by a pin 33 fixed in the body 5 (Fig. 2). The stem carries an 100

axial firing pin 34 for actuating the primer 26 of the delay train 27.

The impact plate is held in safe position with the firing pins in spaced relation with respect to the detonator and delay element by means of a shear pin 35 and also by means of a group of spacers 36 interposed between the body 5 and the flanged head 37 of the impact plate. The spacers are connected by a flat spring 38 which ejects them from under the flanged head when a vane assembly has unscrewed in flight and dropped clear of the bomb.

The vane assembly is of standard type and consists of a cup 39, vanes 40 and a stem 41 threaded in the impact plate. To prevent the vane assembly from turning the usual sets of ears 42 and 43 are respectively provided on the cup 39 and body 5 and receive a cotter pin 44 which is replaced by the release wire (not shown) of the bomb releasing mechanism of an aircraft. Such release wire is withdrawn in the customary manner when the bomb leaves its rack in the aircraft.

The body 5 and the impact plate 30 are provided with aligned apertures respectively 45 and 46 in which is placed the rod 16 normally extending into the transverse passage 7 to control movement of the carrier 14. The rod is formed with a collar 47, and a spring 48, embracing the rod and confined between the collar and the floor of the cavity 32 in the body, urges the rod to withdrawal from the path of movement of the carrier. In the unarmed position of the fuse the action of the spring is opposed by the vane assembly through the intermediation of a pair of balls 49.

A stop pin 50 extending through the body and impact plate for communication with the aperture 46 forwardly of the collar 47 is provided with a threaded head 51 engageable in a tapped opening 52 in the body.

When the head 51 seats against the floor of the opening 52, the inner end of the pin 50 is positioned in the path of movement of the collar to limit its withdrawal under the action of the spring. As shown in Fig. 3 this position corresponds to the first arming position of the carrier 14, the rod 16 being now in engagement with the face 21 of the carrier. It will be noted that the foremost end of the rod does not extrude from the impact plate and will therefore not be driven inwardly before the impact plate strikes the ground. The pin 50 is sheared from the body on impact, and the rod, driven inward by virtue of the connection between the pin and collar, may be deformed or allowed to pass in an aperture 53 in the carrier 14 as indicated in dotted lines.

When the pin 50 has been retracted from the aperture 46, which fact may be indicated when it is flush with the external face of the body 5, the rod is completely expelled from

the fuse during flight and the carrier is free to assume the second armed position as shown in Fig. 4.

Setting of the fuse for instantaneous action or for delay action is accomplished by the simple operation of advancing the pin 50 into the passage 46 or retracting it therefrom, to control the movement of the carrier 14. In the safe or unarmed position (Fig. 1) the detonating trains are interrupted, a blind recess 54 in the carrier 14 being in line with the firing pin 28 and the delay train 27 being separated from the booster by the carrier.

When the fuse is set in the first armed position for instantaneous action the axial firing pin will also function the primer of the delay train but this is of no consequence. In the second armed position, the firing pin 28 will enter the passage 7 in rear of the carrier 14, the detonator being disposed axially of the fuse.

I claim:

1. A fuse including a body, a primer delay train axially of the body, an impact plate mounted for longitudinal movement in the forward part of the body, a pair of firing pins on the impact plate, one of them being axially of the fuse, a vane unit removable during flight for holding the impact plate, a shear pin for holding the impact plate, a transversely movable carrier having a stepped end mounted in the body, a detonator in the carrier, a booster charge available to the carrier, a rod extending longitudinally through the body and impact plate and into the path of movement of the carrier, said rod confined by the vane unit, a collar on the rod, a spring confined between the collar and the body, and tending to expel the rod and a pin positionable in the path of movement of the collar to arrest the rod when it has cleared the stepped end of the carrier.

2. A fuse including a body, a delay train fixed in the body, a booster charge spaced from the delay train, a transversely movable carrier having a stepped end between the delay train and booster charge, a detonator in the carrier, a pair of firing pins movable in unison on impact, one of them normally in line with the delay train, a vane unit removable during flight to arm the firing pins, a longitudinally movable rod held in the path of movement of the carrier by the vane unit and holding the carrier with the detonator out of line with the firing pins, a collar on the rod, a spring acting on the collar and tending to expel the rod, and a pin positionable in the path of movement of the collar to arrest the rod when it has cleared the stepped end of the carrier.

3. A fuse including a body, a delay train fixed in the body, a booster charge spaced from the delay train, a transversely movable carrier between the delay train and booster charge, a detonator in the carrier, a pair of

firing pins movable in unison on impact, one of them normally in line with the delay train, a vane unit removable during flight to arm the firing pins, a longitudinally movable rod held in the path of movement of the carrier by the vane unit and holding the carrier with the detonator out of line with the firing pins, a collar on the rod, a spring acting on the collar and tending to expel the rod, and means for controlling movement of the rod when the vane unit is removed.

4. A fuse including a body, a delay train fixed in the body, a booster charge spaced from the delay train, a transversely movable carrier between the delay train and booster charge, means for moving the carrier, a detonator in the carrier, a pair of firing pins movable in unison on impact, one of them normally in line with the delay train, a vane unit removable during flight to arm the firing pins, a longitudinally movable rod held in the path of movement of the carrier by the vane unit and holding the carrier in unarmed position, means normally tending to expel the rod and selectively adjustable means for limiting movement of the rod.

5. A fuse including a body, a delay train fixed in the body, a booster charge spaced from the delay train, a transversely movable carrier between the delay train and booster charge, means for moving the carrier, a detonator in the carrier, a pair of firing pins movable in unison on impact, one of them normally in line with the delay train, means for holding the carrier in unarmed position, and means including said preceding means for controlling step by step movement of the carrier.

6. A fuse including a body, a delay train fixed in the body, a booster charge spaced from the delay train, a transversely movable carrier between the delay train and booster charge, means for moving the carrier, a detonator in the carrier, a pair of firing pins movable in unison on impact, means for holding the carrier in unarmed position, and means including said preceding means for controlling step by step movement of the carrier.

7. A fuse including a body, a delay train fixed in the body, a booster charge spaced from the delay train, a transversely movable carrier between the delay train and booster charge, means for moving the carrier, a detonator in the carrier, a pair of firing pins movable in unison on impact, and selectively adjustable means operable during flight for controlling movement of the carrier from unarmed position to place the detonator in line with one or the other of the firing pins.

8. In a fuse, a carrier having a stepped end mounted for movement transversely of the fuse, means for moving the carrier, a rod normally engaging the foremost face of the stepped end of the carrier and longitudi-

nally movable to control step by step movement of the carrier, separate means forming an extension of the rod, means confining said separate means and removable during flight, means normally tending to expel the rod, and selectively adjustable means controlling movement of the rod.

9. In a fuse, a carrier having a stepped end mounted for movement transversely of the fuse, means for moving the carrier, a rod normally engaging the foremost face of the stepped end of the carrier and longitudinally movable to control step by step movement of the carrier, separate means forming an extension of the rod, removable means confining said separate means, means normally tending to expel the rod, and selectively adjustable means controlling movement of the rod.

10. In a fuse, a carrier having a stepped end mounted for movement transversely of the fuse, means for moving the carrier, a rod normally engaging the foremost face of the stepped end of the carrier and longitudinally movable to control step by step movement of the carrier, removable means confining said rod, means normally tending to expel the rod and selectively adjustable means controlling movement of the rod.

11. In a fuse, a member mounted for movement transversely of the fuse, means for moving said member, means for controlling step by step movement of the member, and means for holding said member in arrested positions corresponding to the step by step movement.

12. In a fuse, a transversely movable member having a stepped end, a longitudinally movable member positionable to engage the steps of the transversely movable member, and means for controlling positioning of the longitudinally movable member.

13. In a fuse, a movably mounted member having a stepped end, a member positionable to engage the steps of said member, and means for controlling the position of the positionable member.

JOHN M. KING.