April 25, 1961 A. S. WILL ET AL 2,981,190

BOMB FUZE

Filed Sept. 24, 1953

2 Sheets-Sheet 1

FIG. 1.

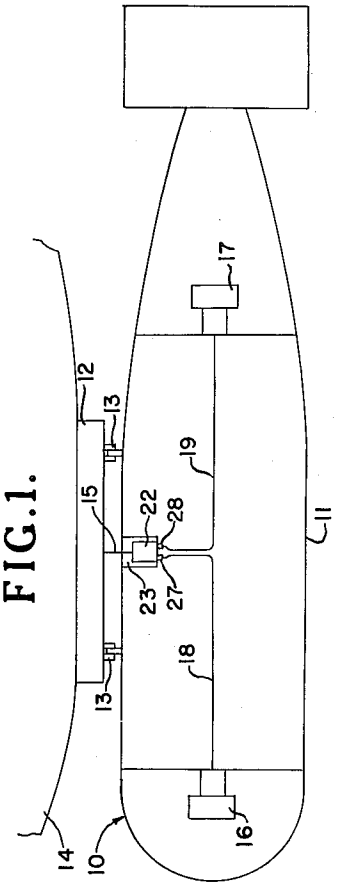
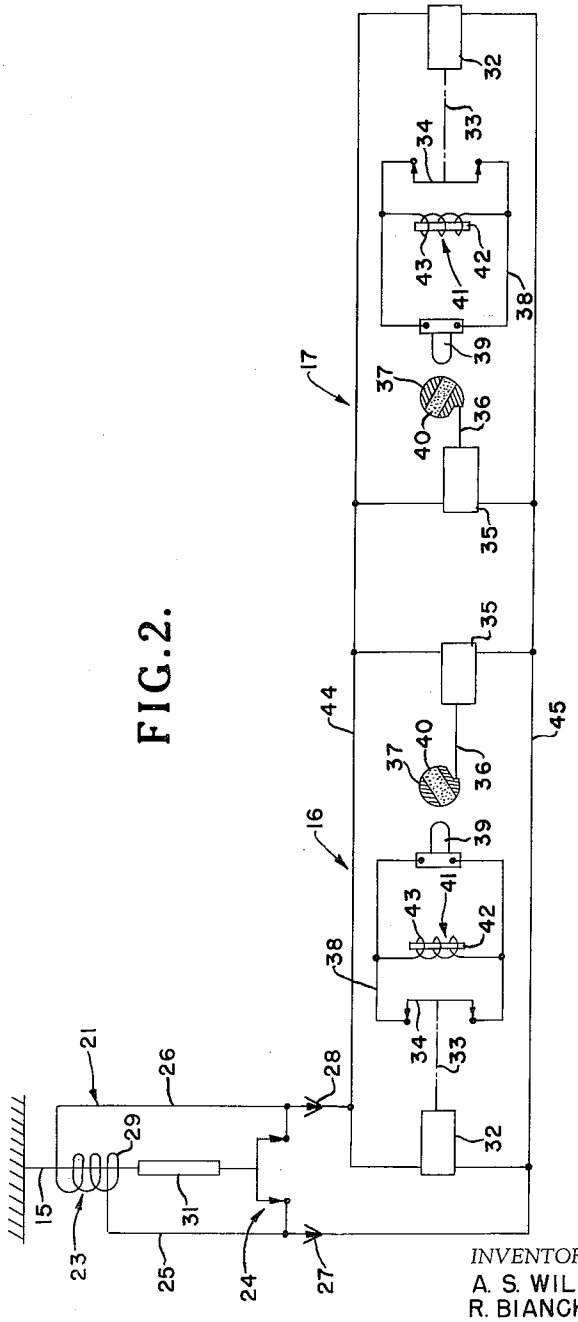


FIG. 2.



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FIG.4.

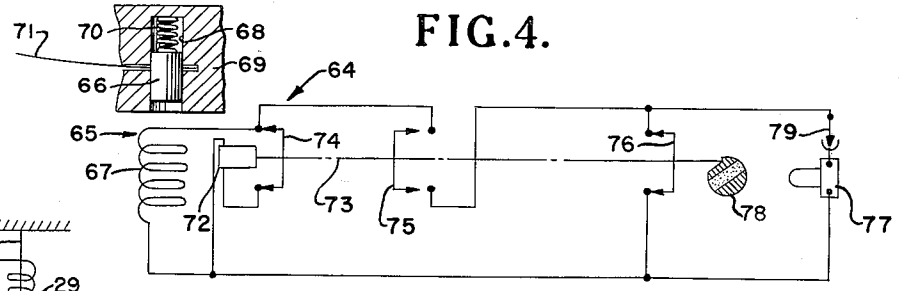


FIG.3.

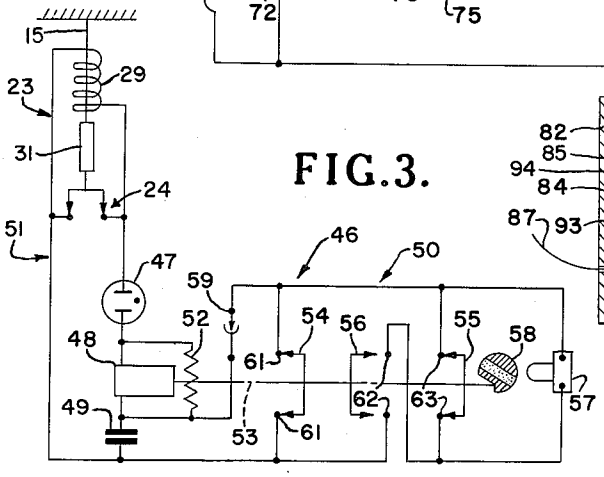


FIG.5.

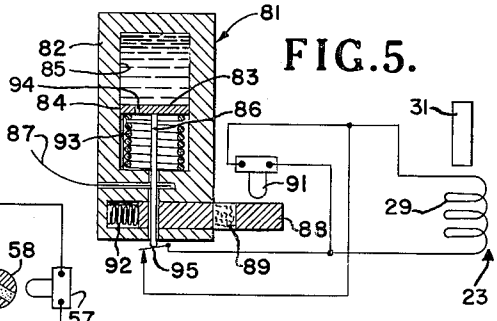


FIG.6.

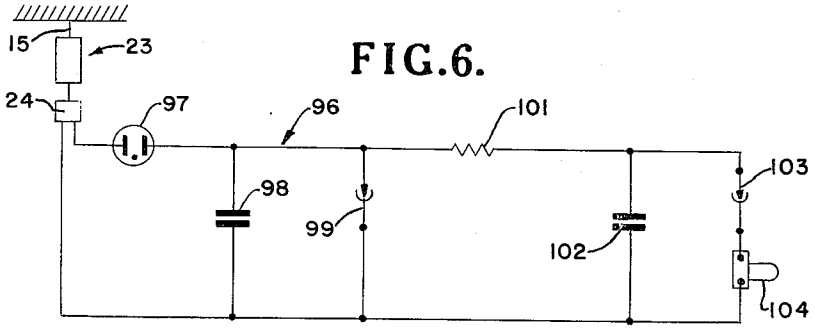
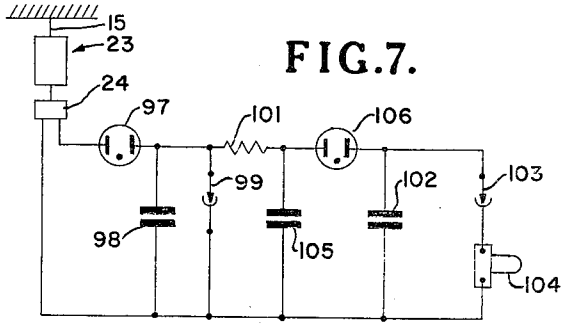


FIG.7.



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2,981,190

Patented Apr. 25, 1961

2,981,190

BOMB FUZE

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Filed Sept. 24, 1953, Ser. No. 382,227

13 Claims. (Cl. 102—70.2)

(Granted under Title 35, U.S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

The present invention relates to a bomb fuze and more particularly to a new and improved electric fuze suitable for use with a low drag fire bomb.

Heretofore, fire bombs employed mechanically actuated fuzes wherein means controlled by the wind driven impeller released the arming means for movement from an initial safe position to an armed position when the impeller made a predetermined number of revolutions during the free flight of the bomb toward a target after being released from an aircraft in flight. It has been found in actual practice, however, that the impeller type arming devices now in use have not proven entirely satisfactory particularly when the bomb is launched from a high-speed aircraft for the reason that the impeller is unable to withstand the high pressure to which it is subjected as the bomb is released from the aircraft and during the air travel thereof toward the target.

The present invention contemplates the provision of a new and improved fuze arrangement for a fire bomb which overcomes all the disadvantages heretofore encountered in prior art fuze devices by providing a new and improved electrically controlled system for arming and firing an incendiary bomb. Moreover, the present invention provides an electric fuze arrangement wherein switch means are employed for maintaining the fuze in a safe condition until the bomb has been released from an aircraft in flight and traveled a predetermined distance therefrom whereupon delayed arming means responsive to an electrical impulse generated as the bomb falls away from the aircraft, delays the arming of the fuze for a predetermined period of time after release of the bomb from the aircraft and in which means responsive to impact of the bomb with the target produces an electrical impulse of sufficient strength to fire an electro-responsive detonator thereby to cause fragmentation of the bomb casing and thus scatter the ignited incendiary mixture over a large target area. Moreover, the voltage generator is adapted to be employed in connection with suitable rectifying means or a diode, whereupon sufficient voltage is generated by the generator as the bomb is released and falls away from the aircraft to break down the diode and fire a time delay device thereby to arm the fuze and charge suitable storage means in time delayed relation with respect to release of the bomb. The charged storage means is adapted to be instantaneously discharged upon impact of the bomb with the target thereby to fire the electroresponsive detonator and explode the bomb. Furthermore, the fuze is provided with means whereby sterilization of the fuze will occur should the bomb strike a target prior to the expiration of the time delay period.

An object of the present invention is the provision of a new and improved electric fuze system for use with a fire bomb.

Another object of the invention is to provide a fuze for a fire bomb wherein means actuated by an arming wire maintains the fuze in a safe position until the bomb is released from an aircraft in flight and traveled a predetermined distance therefrom.

Another object of the invention is to provide an electric fuze for an incendiary bomb having delay arming means responsive to an electrical impulse for arming the fuze in time delayed relation with respect to the release of the bomb from an aircraft in flight.

A further object of the invention is to provide an electric fuze for a bomb wherein means including an impulse generating device is adapted to arm the fuze as the bomb is released and moved a predetermined distance from an aircraft in flight.

A still further object of the invention is the provision of an electric fuze wherein generator means actuated as the bomb is released and falls away from an aircraft in flight is adapted to generate an electrical impulse of sufficient magnitude to fire an explosive delay arming device thereby to delay arming of the fuze for a predetermined period of time after actuation of the generator means.

Still another object of the invention is the provision of an electric fuze wherein means responsive to an electrical impulse generated as the bomb is released and falls away from an aircraft in flight actuates the fuze to an armed position and in which means responsive to impact of the bomb with the target discharges sufficient energy to fire an electroresponsive detonator thereby to cause fragmentation of the bomb casing and scattering of the ignited incendiary mixture over a large target area.

An additional object of the invention resides in the provision of an electric fuze for a fire bomb wherein an explosive element fired in response to an electrical impulse received thereby actuates the fuze to an armed position in time delayed relation with respect to release of the bomb from an aircraft in flight and in which means are provided for causing sterilization of the fuze should the bomb strike a target prior to the expiration of the time delay period.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

Fig. 1 is a schematic view of the fuze arrangement of the present invention illustrating a preferred embodiment thereof in connection with a fire bomb and a portion of an aircraft to which the bomb is releasably connected;

Fig. 2 is a diagrammatic representation of the electric fuze arrangement of the device of Fig. 1, in accordance with the present invention;

Fig. 3 is a diagrammatic view of an alternate arrangement of the device of Fig. 1;

Fig. 4 is a diagrammatic view of another arrangement of the device of Fig. 1;

Fig. 5 is a view similar to Fig. 4 illustrating another arrangement of the electric fuze; and

Figs. 6 and 7 are diagrammatic views illustrating still further arrangements of the electric fuze.

Referring now to the accompanying drawings wherein like reference characters designate like parts throughout the several views and more particularly to Fig. 1 thereof the numeral **10** generally indicates a fire bomb comprising a casing **11**. The bomb **10** is a conventional type fire bomb and is adapted to be provided with the usual incendiary mixture such, for example, as gasoline gel or the like. Fire bombs are effectively used against personnel, wooden piers, storage depots, inflammable materials and the like since upon impact they burst and scatter the flaming mixture over a large target area and thus causing considerable damage thereto.

The bomb 10 is releasably supported on the bomb rack 12 by the conventional bomb release means indicated by the reference character 13 whereupon the bomb may be released at will from an aircraft in flight toward a target by the bombardier, the bomb rack 12 being mounted on the aircraft in the conventional manner, preferably to each wing thereof, one of which is shown on Fig. 1, and indicated by the reference character 14. Furthermore, an arming wire 15 is secured to the rack in any manner and detachably secured to the fuze thereby to provide means for actuating the arming system of the fuze when the bomb is released and falls a predetermined distance from the aircraft, the arming cycle of the fuze being more clearly set forth hereinafter.

The electric fuze of the present invention is particularly adapted to initiate the conventional pyrotechnic material arranged within the fire bomb thereby to cause fragmentation of the bomb upon impact thereof with a target. The device of the present invention comprises a pair of fuzes 16—17 which are identical in structure, fuze 16 being disposed within the nose of the bomb and fuze 17 being disposed within the tail of the bomb, Fig. 1. The aforesaid fuzes are secured to the bomb casing in any conventional manner and suitable cables 18—19 are employed for operatively connecting the fuzes 16—17 together electrically and to an actuating unit generally indicated by the numeral 21 enclosed in a casing 22.

With reference to Fig. 2, it will be noted that the aforesaid unit 21 comprises a magnetic impulse generator 23 and a normally closed switch 24, the generator being normally shorted by the switch and operatively connected to the fuzes 16—17 by conductors 25—26 and plug and jack connections 27—28 and thus by this arrangement the unit may be readily attached and detached from the bomb, if desired. The generator 23 comprises a coil 29 and a movable magnet or core 31 fixed to the arming wire 15 which wire is detachably secured to the switch in such a manner that the switch is actuated to an open position and the arming wire is released therefrom prior to the movement of the magnetic element 31 through the coil 29 in response to the movement of the bomb away from the aircraft after being released therefrom.

As shown on Fig. 2, each fuze comprises a time delay explosive element 32 having an actuating member 33 secured thereto and to a normally closed switch 34, and a second time delay explosive device 35 having an actuating member 36 secured thereto and to an arming rotor 37, an explosive charge or primer 40 mounted in the rotor, a firing circuit 38, an electroresponsive detonator 39, and a magnetic inertia generator 41 included in the firing circuit and comprising a movable magnetic core 42 and a coil 43.

As shown on Fig. 2, the aforesaid explosive devices 32 and 35 are connected in parallel across conductors 44—45, conductor 44 being connected to one terminal of the coil 29 by way of connector 28 and conductor 26, and conductor 45 being connected to the other terminal of the coil 29 by way of connector 27 and conductor 25 and thus establishing an initiating circuit from the impulse generator 23 to the explosive switch devices 32 and 35. It will be noted, however, that the generator 23 is shorted by the normally closed switch 24 and the generators 41 are shorted by the normally closed switch 34. Furthermore, the arming rotors 37 are in an initial safe position with explosive charges 40 therein being out of alignment with the detonators 39. Thus with the aforesaid elements and component parts of the fuzes in the aforesaid position premature firing thereof is prevented.

The explosive devices 32—35 are provided with suitable delay elements adapted to be fired in response to an electrical impulse received thereby from the generator 23 as the generator is operated as the bomb is released from the aircraft and falls away therefrom. As the explosive devices 32 are fired by the delay element therein,

the switches 34 are moved to an open position by the actuating members 33 in predetermined time delayed relation with respect to the firing of the delay elements. Furthermore, as the explosive devices 35 are fired by the delay elements therein the primers 40 in the rotors 37 are moved into alignment with the detonators by the actuating members 36 in predetermined time delayed relation with respect to the firing of the delay elements. When this occurs the fuzes 16 and 17 are armed. While the delay elements in the explosive devices 32—35 provide substantially the same time interval before the explosive devices are fired, it will be understood, however, that any time sequence between the firing of one with respect to the other may be provided, if desired. The aforesaid delay elements are adapted to provide a time delay period of substantially 1.5 seconds thereby to provide sufficient time to permit the bomb to travel a safe distance from the aircraft before arming of the fuzes.

In operation of the aforesaid device it will be understood that upon release of the bomb from an aircraft in flight the switch 24 is moved to an open position by the arming wire 15 prior to operation of the impulse generator 23. As the bomb falls away from the aircraft, the switch 24 is opened thereby unshorting the initiating circuit between the generator 23 and explosive devices 32—35. Upon further movement of the bomb from the aircraft the arming wire is released from the now open switch 24 and the magnetic element 31 of the generator 23 is moved through coil 29 by the arming wire 15 and in response to such movement of the core with respect to the coil an electrical impulse of sufficient strength is generated therein to fire the delay elements arranged within the explosive devices 32 and 35. When a predetermined period of time has elapsed, the explosive devices 32—35 are fired by the delay elements associated therewith. Upon firing of the devices 32 the actuating member 33 moves the switches 34 to an open position thereby unshorting the detonators 39 and providing a firing circuit from the inertia magnetic generators 41 to the detonators 39. Furthermore, upon firing of the devices 35 the actuating members 36 move the arming rotors 37 a sufficient amount to align the primers 40 with the detonators 39. Thus the fuzes are armed and upon impact of the bomb with a target, the magnetic element 42 is moved through the coil 43 and in response to such movement sufficient energy is generated in the coil to fire the detonators 39 thereby to cause fragmentation of the bomb casing and scatter the ignited incendiary mixture over a large target area.

In the arrangement of Fig. 3, it will be noted that the impulse generating means and the shorting means are the same as shown on Fig. 2 and also function in like manner to the arrangement of Fig. 1. The fuze 46 of Fig. 3 is provided with a cold cathode gas diode 47, an explosive delay device 48, similar to the explosive device 32, and a condenser 49 which are included in an initiating circuit 51 normally shorted by the switch 24. Furthermore, the explosive delay device 48 is provided with a resistor 52 which is disposed between the diode 47 and the condenser 49 and in parallel with the bridge element of the conventional delay squib of the explosive device, the purpose of which will be hereinafter more clearly set forth.

It will be noted in the arrangement of Fig. 3, that the explosive switch 48 is arranged within the firing circuit 50 and provided with an actuating member 53 operatively connected to the device 48 and adapted to be moved thereby as the device is fired in response to an electrical impulse received thereby. The actuating member 53 is operatively connected to a pair of normally closed switch elements 54—55, a normally open switch element 56, and an arming rotor 58. A normally open impact switch 59 is included in the firing circuit 50, the switch being actuated to a closed position in response to impact of the bomb with a target. It will be understood that in the

aforesaid arrangement the explosive device **48** is fired and the condenser **49** is charged after the switch **24** has been actuated to an open position and the coil **29** has generated sufficient energy to cause the diode **47** to break down in response to movement of the magnetic element therethrough.

By the use of the resistor **52**, an electrical path between the generator and condenser will be established should the bridge element of the delay squib fuse or burn prematurely thereby to ensure charging of the condenser **49**. Furthermore, the switch elements **54**, **55** and **56** mounted on the actuating member **53** maintain the fuze in an initial safe position and are adapted to arm the fuze as the member **53** is moved a predetermined amount by the explosive device as the device is fired by the delay element thereof, the time interval between firing of the delay element and operation of the actuating member **53** by the explosive device being, by way of example, substantially 1.5 seconds.

It will be noted that when the fuze is in a safe condition, the switch element **54** is in engagement with contacts **61**, switch element **56** is normally out of engagement with contacts **62** and switch element **55** is normally in engagement with contacts **63**. By the aforesaid switch arrangement, the condenser **49** is normally shorted by the switch **54** and thus should the impact switch **59** be actuated to a closed position prior to the expiration of the aforesaid time delay period the condenser will be discharged through switches **59** and **54**. Furthermore, switch **56** and contacts **62** interrupt the firing circuit to the primer **57** and switch **55** and contacts **63** maintained the primer **57** shorted. Moreover, the firing circuit **50** to the primer **57** remains interrupted and the primer remains shorted until the explosive device has been fired. When this occurs, switch element **54** is moved out of engagement with contacts **61**, switch element **56** is moved into engagement with contacts **62**, switch element **55** is moved out of engagement with contacts **63** and the arming rotor **58** is moved to an armed position. Thus the fuze is armed, however, the energy stored in the condenser **49** will not be discharged therefrom through the primer **57** until the impact switch **59** is actuated to a closed position in response to impact of the bomb with the target. When this occurs, the energy in the condenser **49** is discharged through the primer **57** thereby to fire the primer, the flash from the primer fires the explosive train arranged within the arming rotor **58** and thus the bomb is exploded and the ignited incendiary mixture is scattered over the target area.

In the arrangement illustrated on Fig. 4, the fuze is generally indicated by the reference character **64** and is provided with an impulse generator **65** comprising a movable inertial magnetic element **66** and a coil **67**. The movable element **66** is disposed within a recess **68** formed in a suitable receptacle **69** carried by the bomb and maintained within the recess and detachably secured to the receptacle by the arming wire **71**. The movable element is adapted to be forcibly ejected from the recess and through the coil by a spring **70** as the bomb is released from the aircraft and the arming wire **71** is withdrawn from the receptacle in response to movement of the bomb away from the aircraft. As the magnetic element **66** moves through the coil **67**, sufficient voltage is generated in the coil to fire the pyrotechnic delay device **72** which functions in the same manner as the aforesaid explosive devices shown on Figs. 2 and 3. When the explosive device **72** is fired, the actuating member **73** thereof moves the switch elements **74**, **75** and **76** a sufficient amount to interrupt the circuit between explosive device **72** and the generator **65**, to connect the generator in series with the primer **77** and impact switch **79**, to unshort the primer; and to move the arming rotor **78** from an initial safe position to an armed position thereby arming the fuze. In this arrangement it will be understood that the generator **65** is also adapted to generate a voltage impulse in the coil of sufficient energy to fire the primer **77** as the movable inertial element **66** in response to the force of target impact overcomes the force of spring **70** and is moved therethrough whereupon the impact switch **79** is closed in response to impact of the bomb with the target thereby to function the bomb on the target.

The fuze system of Fig. 5 comprises a dash pot arrangement generally indicated by the reference character **81** and comprising a casing **82** having a piston **83** movably arranged therein. The piston comprises a head **84** disposed within a chamber **85** formed in the casing **82** and a stem **86** slidably arranged within the casing and releasably locked thereto by an arming wire **87**. An arming slider **88** is slidably arranged within the casing **82** for movement from an initial safe position to an armed position when released, the slider being maintained in an initial safe position by the stem **86**. The slider **88** is provided with an explosive element **89** normally out of alignment with the primer **91** and adapted to be moved into alignment therewith by spring **92** when the arming wire is withdrawn from the stem **86** and the piston is moved by the spring **93** an amount sufficient to disengage the stem from the slider.

The movement of the piston to a release position by spring **93** is retarded by the fluid in the chamber and since the head **84** is provided with a minute bleeder opening **94**, moving of the piston to a release position will be in the neighborhood of 1.5 seconds after release of the bomb from the aircraft thereby delaying arming of the fuze until the bomb has travelled a predetermined distance from the aircraft. Furthermore, in this arrangement, it will be noted that the primer **91** is shorted by a normally closed switch **95** maintained in a closed position by the stem **86** of the piston and adapted to be moved to an open position when the piston is moved to the aforesaid release position. When this occurs a firing circuit from the magnetic inertia generator **23** to the primer **91** is established and thus upon impact of the bomb with the target, the primer is fired in response to an electrical impulse generated by the generator.

In the arrangement of Fig. 6, the fuze is generally indicated by the reference character **96** and comprises an RC time delay circuit for delaying the arming of the fuze in lieu of the pyrotechnic delay devices heretofore shown and described. The circuit includes a diode **97**, a storage condenser **98**, a switch **99**, a resistor **101**, a firing condenser **102**, an impact firing switch **103**, and a primer **104**. In like manner to Figs. 2 and 3, the magnetic generator **23** and shorting switch **24** are employed with the device of Fig. 6 and are adapted to be actuated by the arming wire **15**.

It will be understood, however, that when the switch **24** and generator **23** are operated sufficient voltage is generated thereby to cause the diode to break down and thus the storage condenser **98** is charged, which in turn charges firing condenser **102** by way of resistor **101** when a predetermined period of time has elapsed. Moreover, the voltage increase on the firing condenser **102** is sufficient to fire the primer in substantially 1.5 seconds. However, should impact occur prior to the aforesaid time interval, voltage on the firing condenser will be insufficient to fire the primer and the voltage on the storage condenser **98** will be discharged by way of the impact switch **99** which prevents further build up of the charge on the firing condenser **102**. However, at the expiration of the 1.5 seconds delay period the voltage on the firing condenser has increased to an amount sufficient to fire the primer **104**. Thus, upon impact of the bomb with the target impact switch **103** is actuated to a closed position and the condenser **102** is discharged through the switch and the primer **104** whereupon the bomb is exploded and the ignited incendiary mixture thereof is scattered over the target area.

The arrangement of Fig. 7 is similar to the device of Fig. 6 and in like manner is functioned by an electrical

impulse developed as the generator **23** is actuated and the switch **24** has been moved to an open position. In this arrangement, however, additional means are provided for delaying the charging of the firing condenser **102** and include a timing condenser **105** and a cold cathode gas diode **106** which are disposed between the timing condenser **105** and the firing condenser **102**. Furthermore, with the cold cathode diode **106** arranged within the circuit as shown, the firing condenser **102** is isolated from the timing condenser **105** and thus eliminating the need for accurate adjustment of the primer firing energy. Moreover, when the generator **23** is operated sufficient energy is developed thereby to break down the cold cathode diodes **97** and **106** and to charge the condenser **98**, **105**, and **102** whereupon the firing condenser **102** ultimately attains a voltage of sufficient magnitude to fire the primer **104**. Thus upon impact of the bomb with a target the firing condenser **102** is discharged through the detonator **104** by way of now closed impact switch **103** thereby to fire the detonator and explode the bomb on the target.

From the foregoing, it will be apparent that a new and improved electric fuze has been devised for use in a fire bomb wherein means responsive to an electrical impulse generated as the bomb is released and falls away from an aircraft causes the fuze to be armed in time delayed relation with respect to release thereof, and in which means responsive to impact of the bomb with a target causes sufficient electrical energy to be discharged therefrom to fire an electroresponsive detonator instantaneously thereby to explode the bomb and scatter the ignited incendiary mixture over a large target area. Furthermore, the fuze device provides new and improved means including a normally short circuit arrangement for maintaining the bomb in a safe condition until the bomb has been released from an aircraft in flight, and in which means responsive to a sudden impact prevents firing of an electroresponsive detonator until a predetermined period of time has elapsed after release of the bomb from the aircraft.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. In a bomb adapted to be released from an aircraft in flight comprising a fuze, means for maintaining the fuze in a safe condition until the bomb is released from said aircraft, means responsive to an electrical impulse for arming said fuze in time delayed relation with respect to the release of the bomb from said aircraft, generating means operated by the movement of said bomb away from said aircraft for generating said impulse, an electroresponsive detonator in said fuze, and means responsive to impact of the bomb with a target for generating sufficient electrical energy to fire said detonator thereby to explode the bomb.

2. In a bomb adapted to be released from an aircraft in flight comprising a fuze, an electrical circuit in said fuze, a normally closed switch included in said circuit for maintaining the fuze in a safe condition until said switch is actuated to an open position, means for actuating said switch to said open position in response to movement of the bomb away from said aircraft after release of the bomb therefrom, explosive means included in the circuit and fired in response to an electrical impulse when said switch is in said open position, a magnetic impulse generator in electrical communication with said explosive means when said switch is in said open position for generating said electrical impulse in response to said movement of said bomb, a normally shorted electroresponsive detonator included in said circuit, means operatively connected to said explosive means for rendering the detonator effective as the explosive means is fired, and means including a device responsive to impact of the bomb with a target for generating sufficient electrical energy to fire the detonator thereby to explode the bomb.

3. An electric fuze for use in a fire bomb adapted to be released from an aircraft in flight comprising a normally shorted electrical circuit, means for rendering said circuit effective as the bomb is released and falls away from said aircraft, a magnetic impulse generator included in said circuit for generating an electrical inpulse when said circuit is rendered effective and the bomb has travelled a predetermined distance from said aircraft, explosive means fired in response to said impulse for arming said fuze, means including an impact responsive magnetic generator for generating an electrical impulse as the bomb strikes a target, and an electroresponsive detonator fired by said impulse for exploding the bomb.

4. An electric fuze for use in a fire bomb adapted to be released from an aircraft in flight toward a target comprising a normally shorted electrical circuit, switch means for rendering said circuit effective as the switch means is actuated, means for actuating said switch means as the bomb falls away from said aircraft, a magnetic impulse generator connected to said actuating means and operated thereby for generating an electrical impulse in time delay relation with respect to the actuation of said switch means, an explosive device operatively connected to said generator, means including a delay element disposed within said explosive device and fired by said impulse for arming the fuze in time delay relation with respect to the firing of said delay element, an electroresponsive detonator in said fuze, means operatively connected to said detonator for rendering said detonator effective upon impact of the bomb with said target, and a magnetic voltage generator responsive to said impact for generating a voltage of sufficient strength to fire said detonator thereby to explode said bomb.

5. An electric fuze for use in a fire bomb adapted to be released from an aircraft in flight toward a target comprising a normally shorted initiating circuit, switch means for rendering said circuit effective as the switch means is actuated, means secured to said aircraft and releasably attached to said switch means for actuating the switch means and thereafter releasing said switch means as the bomb falls away from the aircraft, a magnetic impulse generator included in said circuit and connected to said actuating means for generating an electrical impulse a predetermined period of time after actuating of said switch means, an explosive device included in said circuit, a delay element disposed within said explosive device and fired by said impulse for firing said explosive device in time delayed relation with respect to the firing of said delay element, a normally shorted firing circuit, means connected to said explosive device and actuated thereby as the explosive device is fired for rendering said firing circuit effective, an electroresponsive detonator arranged within said firing circuit, and a magnetic voltage generator responsive to impact of the bomb with said target for generating a voltage sufficient to fire said detonator thereby to explode the bomb on the target.

6. An electric fuze for use in a fire bomb adapted to be released from an aircraft in flight toward a target comprising a normally shorted initiating circuit and a normally shorted firing circuit, means for rendering said initiating circuit effective as the bomb is released from said aircraft, explosive means fired in response to an electrical impulse received thereby for rendering said firing circuit effective, impulse generating means included in said initiating circuit for generating said impulse, an electroresponsive detonator in said firing circuit, and means including a magnetic voltage generator for generating a voltage of sufficient strength to fire said detonator thereby to explode the bomb.

7. In an aircraft launched electric bomb fuze, an electroresponsive detonator, a charging circuit, condenser

storage means in said charging circuit, a magnetic impulse generator having a stationary coil and a core movable therethrough upon release of the bomb from the aircraft for developing an impulse included in said charging circuit for charging said storage means, means responsive to said impulse for arming said fuze, means for interrupting said charging circuit when the charge on said condenser has reached a predetermined value, and means for discharging said storage means through the detonator upon impact of the bomb with a target thereby to fire the detonator and explode the bomb.

8. In an electric bomb fuze of the character described, an electrical circuit, storage means in said circuit, a magnetic impulse generator included in said circuit for developing an electrical impulse for charging said storage means, means included in said circuit and rendered effective when the charge on said storage means has reached a predetermined value for interrupting said circuit and maintaining a charge on the storage means, means including an explosive device included in said circuit for arming said fuze as the device is fired in response to said impulse, an electroresponsive detonator, and impact responsive means for discharging said storage means through the detonator upon impact of the bomb with a target thereby to fire the detonator and explode the bomb.

9. An electric fuze of the character described for use in a fire bomb comprising a charging circuit, storage means in said circuit, a magnetic impulse generator included in said circuit for developing an energy impulse for charging said storage means, means included in said circuit and rendered effective when the charge on the storage device has reached a predetermined value for interrupting said circuit and maintaining a charge on said storage means, a normally interrupted firing circuit, a normally open switch means for rendering said firing circuit effective as the switch is actuated to a closed position, an explosive device in said charging circuit for moving said switch to said closed position as the device is fired in response to said impulse, an electroresponsive detonator connected in said firing circuit for electrical communication with said storage means when the switch has been actuated to said closed position, and a normally open inertia switch in said firing circuit for discharging said storage means through the detonator as the switch is moved to a closed position upon impact of the bomb with a target thereby to fire said detonator and explode the bomb.

10. In an electrical fuze for arming an airborne fire bomb in time delayed relation with respect to the release of the bomb from the holding means comprising a normally shorted charging circuit, switch means for rendering said circuit effective as the switch means is actuated from an initial closed position to an open position, means for actuating said switch in response to movement of the bomb away from said aircraft after being released by said holding means, a condenser in said circuit, a magnetic impulse generator in electrical communication with said condenser as said switch means is actuated to said open position for generating sufficient electrical energy to charge said condenser as the generator is operated by said actuating means, means rendered effective when the charge on the condenser has reached a predetermined value for interrupting said charging circuit, means responsive to the energy discharged from said condenser for arming the fuze in time delayed relation with respect to the release of the bomb by said holding means, a firing circuit in electrical communication with said storage condenser when the fuze has been armed, an electroresponsive detonator connected in said firing circuit for electrical communication with said firing condenser, and a normally open inertia switch disposed within said firing circuit for discharging said condenser through said detonator as the switch is operated to a closed position thereby to fire said detonator and explode the bomb.

11. In a bomb adapted to be released from an aircraft in flight comprising a time delay circuit having a storage condenser and firing condenser therein, a magnetic impulse generator including initially spatially displaced core and coil elements, said core element being actuated into proximate relationship with said coil element as the bomb is released from said aircraft for generating sufficient electrical energy to charge said storage condenser, said firing condenser being gradually charged by said storage condenser when the charge on said storage condenser has reached a predetermined value, an electroresponsive detonator connected to said firing condenser, and means responsive to impact of the bomb with a target for discharging said firing condenser through said detonator thereby to fire the detonator and explode the bomb.

12. An electric fuze of the character described for use in a fire bomb comprising a charging circuit, storage means in said circuit, a magnetic impulse generator in said circuit and including cooperatively arranged coil and core elements for charging said storage means with a predetermined amount of electrical energy, means included in said circuit and rendered effective when the charge on the storage device has reached a predetermined value for interrupting said charging circuit and maintaining a charge on said storage means, a time delay circuit, a firing condenser included in said time delay circuit and charged by said storage condenser when the charge thereon has reached said predetermined value, an electroresponsive detonator connected to said firing condenser, and means responsive to impact of the bomb with a target for discharging said firing condenser through said detonator thereby to fire the detonator and explode the bomb.

13. In a bomb adapted to be released from an aircraft in flight comprising a magnetic impulse generator including cooperatively arranged coil and core elements for generating an electrical impulse as the bomb is released and falls away from said aircraft, a time delay circuit having energy storage means therein and rendered effective by said impulse for arming the bomb in time delayed relation with respect to the release of the bomb from the aircraft, an electroresponsive detonator, and an impact responsive device operatively connected to said storage means and detonator for discharging said energy from the storage means through the detonator upon impact of the bomb with a target thereby to fire said detonator and explode the bomb.

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