Jan. 19, 1954

J. M. WHEELER

2,666,388

BOMB FUZE

Filed Aug. 3, 1945

3 Sheets-Sheet 1

FIG. 1.

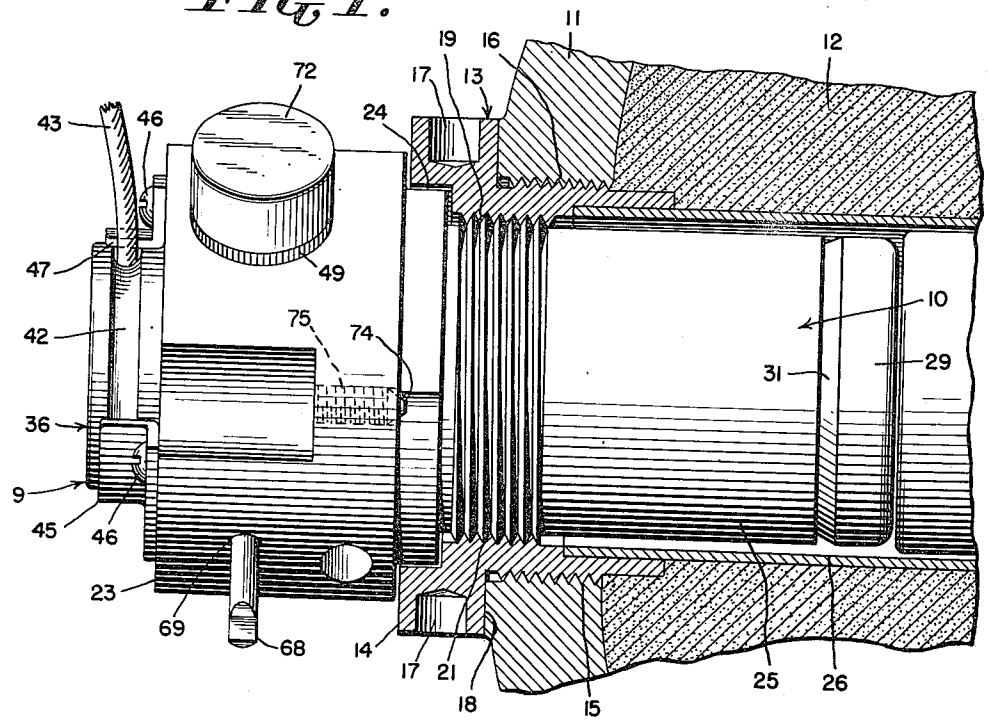
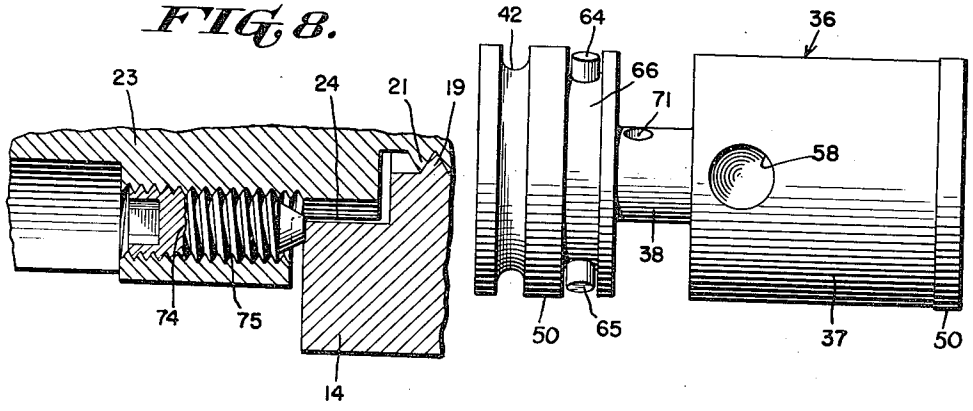


FIG. 9.

FIG. 8.



Inventor

J. M. Wheeler

By Ralph L. Chappell

Attorney

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FIG. 2.

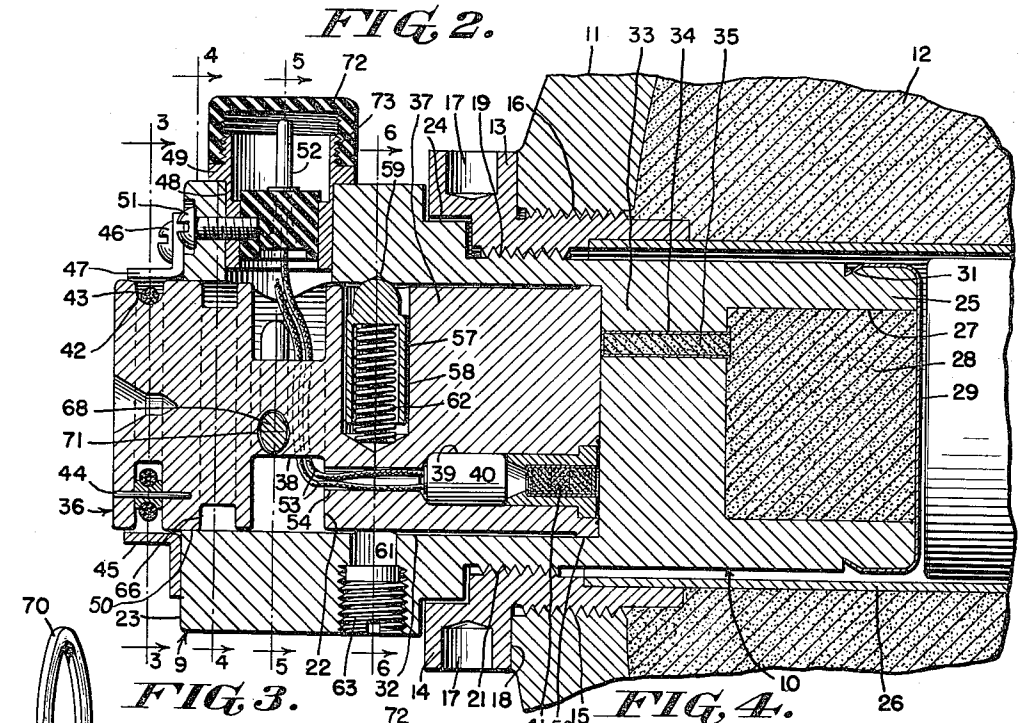


FIG. 3.

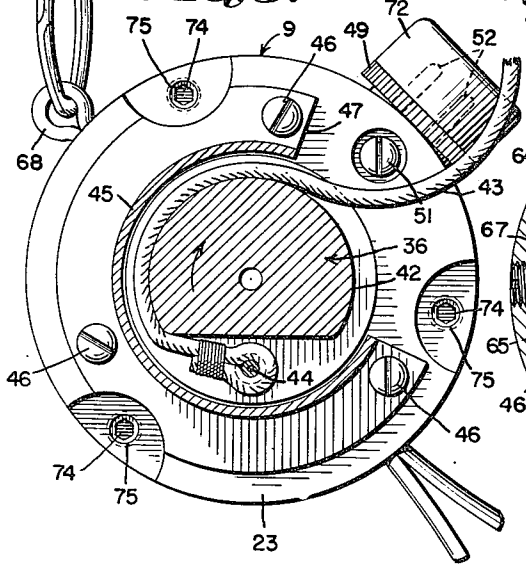
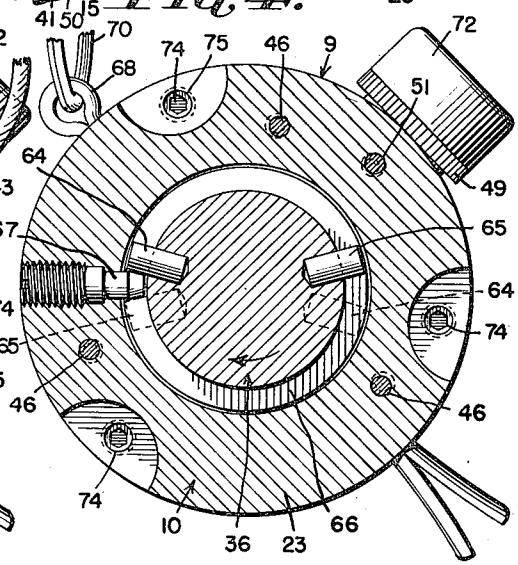


FIG. 4.



Inventor

J. M. Wheeler

By Ralph L. Chappell

Attorney

Jan. 19, 1954 J. M. WHEELER 2,666,388

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FIG. 5.

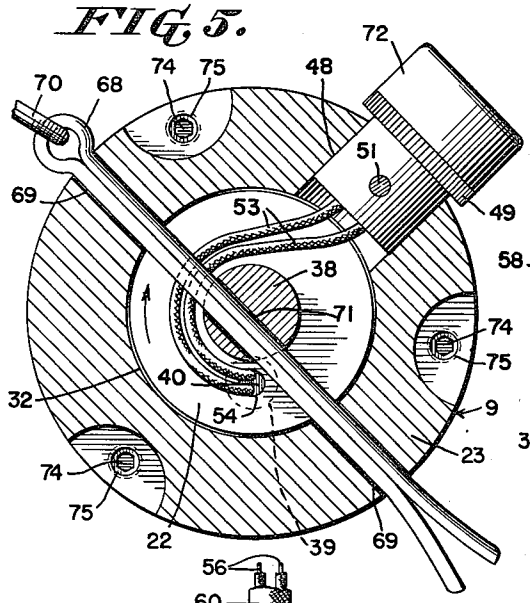


FIG. 6.

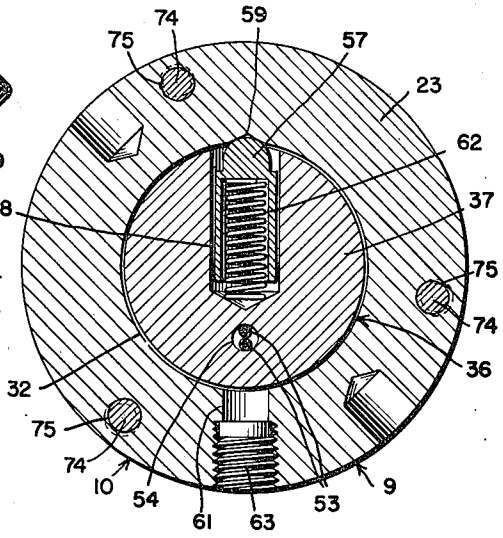
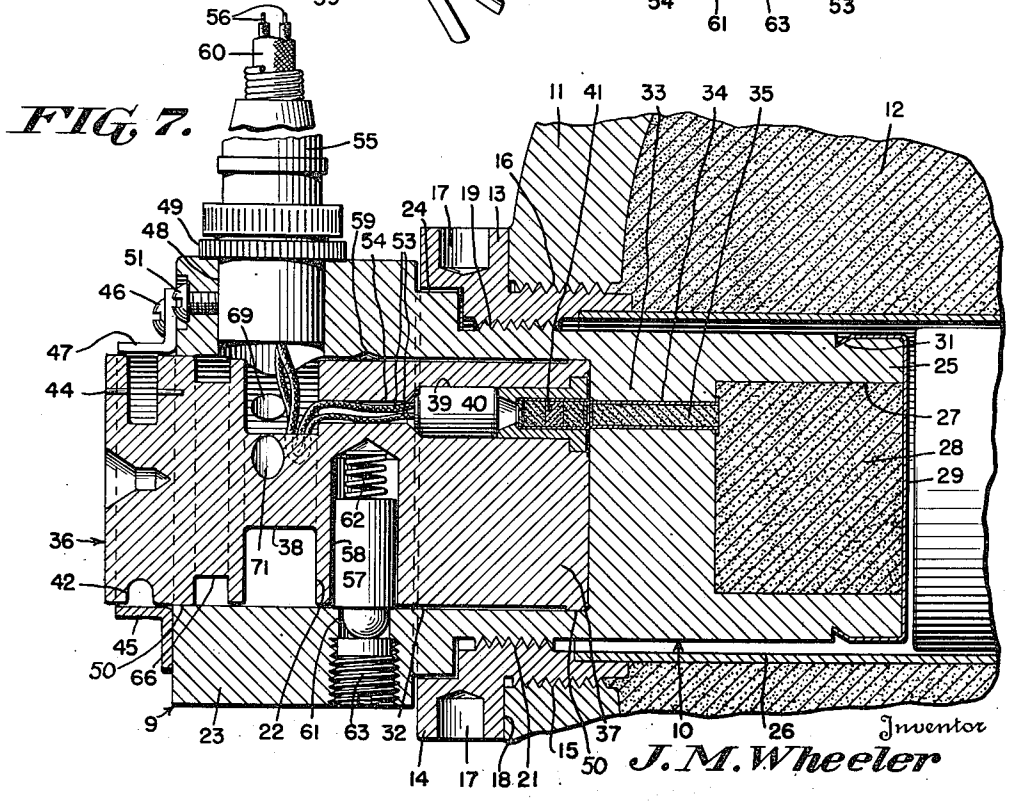


FIG. 7.



Inventor

J. M. Wheeler

By Ralph L. Chappell

Attorney

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2,666,388

BOMB FUZE

John M. Wheeler, Greeley, Colo.

Application August 3, 1945, Serial No. 608,809

7 Claims. (Cl. 102—70.2)

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

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This invention relates to a fuze for a bomb and is particularly adapted for use in a demolition bomb for destroying aircraft, secret equipment and the like employed thereon. It is essential that aircraft and the secret equipment carried thereby be completely destroyed in the event that seizure by the enemy forces appears probable. In the event that the aircraft has been disabled due to enemy gun fire and from all indications the craft will fall into enemy hands, it has been found necessary to destroy the plane and equipment by demolition and it is also necessary to provide a fuze which can be armed, and fired after a predetermined period of time has elapsed sufficient to allow time for the crew members of the plane to bail out before the demolition charge is fired.

The principal object of the invention is the provision of a new and improved fuze for a demolition bomb adapted to be detachably secured to a bomb casing and having a rotatable arming element and an electroresponsive means are ranged therein adapted to fire the demolition charge within the bomb thereby to destroy an aircraft in which the bomb is carried.

Another object of the invention is the provision of a new and improved fuze for a demolition bomb having means for rotating an arming member from an initial safe position to an armed position.

Another object of the invention is the provision of a new and improved fuze for a demolition bomb having means for maintaining the arming member in initial safe position and including means for locking the arming member in an armed position.

Another object of the invention is the provision of a fuze having a rotatable arming member arranged therein including means secured thereto for rotating the arming member to an armed position and having means for firing the explosive charge within the fuze which is effective after the arming member has been rotated to an armed position.

A further object of the invention is the provision of a new and improved fuze for a demolition bomb which is rugged, economical to manufacture, reliable in operation and which possesses the quality of safety during handling and transportation.

Still further objects, novel features and advantages of the invention will become apparent from the following description taken in connection with the accompanying drawings, wherein:

Fig. 1 is an elevational view of a fuze constructed in accordance with the persent invention and showing a fragmentary portion of a demolition bomb and the manner in which the fuze is attached thereto;

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Fig. 2 is a central longitudinal sectional view of the fuze of Fig. 1;

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

Fig. 4 is a sectional view taken on line 4—4 of Fig. 2;

Fig. 5 is a sectional view taken on line 5—5 of Fig. 2;

Fig. 6 is a sectional view taken on line 6—6 of Fig. 2;

Fig. 7 is a view similar to Fig. 2 but showing the fuze in an armed position with an electrical cable connected thereto;

Fig. 8 is a fragmentary sectional view of the casing showing the locking screw therefor; and

Fig. 9 is an elevational view of the arming member.

Referring to the drawings in detail for a more complete understanding of the invention, the fuze 9 disclosed thereon comprises a casing or housing generally indicated by the reference character 10 composed of any material suitable for the purpose such, for example, as steel, brass or the like.

As shown on the drawings, especially Figs. 1, 2 and 7 thereof, the casing 10 of the fuze 9 is detachably secured to a casing 11 of demolition bomb containing the usual main or demolition charge 12, by an adapter generally indicated by the reference character 13 comprising an annular member 14 having a threaded nipple 15 integrally formed thereon and adapted to have threaded engagement with an opening 16 provided in the casing 11 of the bomb. A plurality of recesses 17 are provided in the annular member whereby a spanner wrench or the like may be employed for screwing the adapter into the opening 16 in such a manner as to provide a moisture proof seal between the adapter and a flat surface 18 formed on the casing 11. The adapter 13 is also provided with an internally screw threaded portion 19 having threaded engagement with a threaded portion 21 formed on a casing or housing 10 thus providing means whereby the casing is detachably secured to the adapter.

The casing or housing 10 is provided with an enlarged head 23 having a reduced portion formed thereon adapted to extend into a recess 24 provided in the adapter 13. The casing 10 is also provided with a cylindrical extension 25 upon which the threads 21 are formed. The extension 25 extends a predetermined distance into

a tube 26 secured to the adapter in any suitable manner thereby providing a chamber for enclosing the extension therein and also isolating the demolition charge therefrom.

Arranged within a recess 27 formed in one end of the casing 10 is a booster charge 28, the charge being retained therein by a cup-shaped member 29 adapted to have abutting relation with the booster charge and one end of the casing 11 and also having the flanged portion of the cup-shaped member crimped into a groove as at 31 provided in the casing 10. A recess 32 is provided in the other end of the casing 10 and extends a predetermined distance therein, being separated from the recess 27 by a solid portion 33. An opening 34 extends through the solid portion 33 and communicates with each of the recesses 27 and 32, the opening 34 having disposed therein a lead-in charge indicated by the reference character 35 thereby providing means for firing the booster charge 28.

An arming member indicated generally by the reference character 36 is arranged within the recess 32 and comprises a body portion 37 having an intermediate reduced portion 38 formed thereon thereby providing a relatively wide groove 22 in the arming member 36, the purpose of which will be hereinafter more fully described. The arming member 36 is also provided with a pair of bearing surfaces 50 and a recess or bore 39 in one end thereof and extends a predetermined distance therein. An electroresponsive detonator 40 is arranged within the recess 39 in abutting relation with respect to a sensitive primer 41, the primer being adapted to be fired by the electroresponsive detonator. It will be understood, however, that the detonator is adapted to be fired in response to an electrical impulse supplied thereto from any suitable source. The arming member 36 is also provided with a channel or groove 42 adjacent the outer end thereof having arranged therein a pull rope 43 for rotating the arming member to an armed position. The pull rope may be secured to the arming member 36 in any suitable manner, preferably by a shear pin indicated by the reference character 44 as shown on Figs. 2 and 3 of the drawings. As also shown on Figs. 2 and 3, the pull rope 43 is retained within the groove 42 by a retaining element 45 secured to the casing or housing 10 by a plurality of screws 46. The element 45 is provided with a cutout portion 47 thereby permitting free movement of the pull rope 43 therethrough so that, in response to a sudden pull upon the pull cord, the arming member 36 is rotated to the armed position shown on Fig. 7 of the drawings.

As best shown on Fig. 3 of the drawings, the pull cord 43 is secured to the arming member 36 by the shear pin 44 at a point below the axis thereof, whereby a sudden pull on the pull cord will rotate the arming member in a clockwise direction to an armed position. The enlarged head 23 on the housing 10 is provided with an aperture 48 and a socket member 49 is secured therein by a screw 51. The socket member 49 is provided with a pair of slip connections indicated by the reference character 52, Fig. 3. Each slip connection has secured thereto one end of an electrical conductor 53, the conductors extending about the reduced portion 38 of the arming member 36 and into a bore 54 which communicates with the recess 39, the other end of the conductors 53 being connected to the electroresponsive detonator 40 arranged within the recess 39 thereby providing a firing connection from the slip connection to the detonator.

As shown on Fig. 7 of the drawings a conductor plug 55 is connected to the socket member 49, the plug having one end of a pair of electrical conductors 56 within the cable 60 connected thereto in the usual manner, the other ends of the conductor being connected to a source of electrical supply and time delay device (not shown), such time delay device being in electrical connection with a storage battery or the like for supplying electrical currents to the detonator 40 as the circuit is closed by the time delay device. It will be understood, however, that any electrically or mechanically operated time delay device suitable for the purpose may be employed in the firing circuit whereby a predetermined period of time will elapse after the time delay device has been set in operation before the detonator will be fired, thereby allowing sufficient time to elapse for the personnel of the disabled plane on which the demolition bomb is mounted to bail out before the demolition bomb explodes. The force of the exploding demolition bomb within the plane will be sufficient to demolish completely the plane and the secret equipment mounted therein, thus preventing any of the secret equipment from falling into enemy hands.

The arming member 36 is maintained in a safe or unarmed position by a spring actuated detent 57 arranged within a recess 58 in the arming member 36 and adapted to engage a depression 59 provided in the wall which encircles the recess 32 in casing 10. When the arming member 36 has been rotated to an armed position as shown on Fig. 7 of the drawings in response to a tug upon the pull rope 43, the detent 57 is forced into an aperture 61 provided in the casing 10 under the influence of a spring 62 thereby locking the arming member in an armed position and preventing further rotation thereof in either direction. The aperture 61 is closed by a screw plug 63 thereby excluding dirt and foreign matter from the aperture, thus preventing fouling of the arming member 36 and the detent 57. When the arming member 36 is rotated to the armed position the electroresponsive detonator and primer are brought into line with respect to the lead-in charge and the shear pin 44 is broken, due to the pressure exerted thereon when the rotation of the arming member is suddenly stopped by the detent 57 falling into aperture 61 and thus the pull cord is pulled free of the arming member 36. Whereupon the detonator 40 is adapted to be fired in response to an electrical impulse supplied thereto from any suitable source through the conductor means including the cable 60 thereby to explode the demolition bomb.

A pair of oppositely spaced pins 64 and 65 are secured to the arming member 36 within an annular groove 66 provided therein. The pins 64 and 65 are adapted to engage a stop member 67 secured within the casing 10 and extending into the groove 66. The stop member also maintains the arming member 36 within the recess 32 provided in the casing and prevents endwise movement thereof. It will be understood, however, that during the assembly of the fuze the arming member 36 is inserted into the recess 32 and the pin 64 engages the stop member 67 thereby assuring proper assembly of the fuze whereby the arming member 36 may be rotated to an armed position. When this occurs the pin 65 engages the stop member 67, thereby preventing further rotation of the arming member thus per-

mitting the spring actuated detent 57 to be forced into the opening 58 in response to the pressure exerted thereon by the spring 62.

During transportation and handling the arming member 36 is locked by a safety pin 68 preferably provided with a pull ring 70 and adapted to pass through a pair of registering openings 69 provided in the casing 10 and also pass through an opening 71 within the reduced portion 36 of the arming member. The opening 71 is off-center with respect to the arming member whereby the arming member is invariably locked by the safety pin 68 in predetermined initial safe position. It being understood, however, that the safety pin 68 will be withdrawn from the casing 10 when the plane is ready to take off on a mission thereby releasing the arming member so that the arming member can be rotated to an armed position.

A protector cap 72 is screwed on a threaded portion 73 of the socket member thereby enclosing the slip connections 52 therein thus preventing damage to the slip connections during handling and transportation, it being understod, however, that the cap 72 is removed and the conductor plug 55 is inserted into the socket member 49 in lieu thereof when the plane in which the demolition bomb is mounted is about to take off thereby providing a firing connection by way of the cable 60 from the source of electrical power to the electroresponsive detonator.

When the fuze has been threaded into the adapter 13 and adjusted in proper position within the bomb, a plurality of screws 74 arranged in the casing and having threaded engagement with spaced openings 75 provided therein are adapted to lock the fuze with respect to the bomb casing and prevent any movement of the fuze casing relative thereto, the locking being accomplished by the flat portion of the screws 74 engaging the outer surface of the adapter as best shown on Fig. 8 of the drawings.

While the invention has been described in connection with a domolition bomb for the purpose of destroying aircraft, it will be understood that the fuze may be used in various other types of bombs or demolition devices, as the case may be.

The many advantages of the fuze constructed in accordance with the present invention will be readily apparent from the foregoing description taken in connection with the accompanying drawings and, although a preferred embodiment of the device is illustrated and described, it is to be understood that changes in the details of construction and in the combination and arrangement of parts may be resorted to which fall within the scope of the invention as claimed.

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.

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

1. A fuze for a demolition bomb comprising an adapter, a complementary member supported by said adapter, a booster charge arranged within said complementary member, a releasable arming rotor supported within said complementary member in an initial safe position and adapted to be rotated a predetermined distance to an armed position, a flexible element detachably secured to and wrapped around the

arming rotor for rotating the arming rotor from said initial safe position to said armed position, a frangible member for securing said flexible element to the arming rotor and constructed and arranged to be sheared and to detach the flexible element from the arming rotor in response to pressure exerted thereon as the rotor moves to said armed position, means for releasably maintaining said arming rotor in said safe position, means for locking the arming rotor in said armed position, and electroresponsive means arranged within the arming rotor and adapted to fire said booster charge when the arming rotor has been rotated to said armed position.

2. A fuze for a demolition bomb comprising a casing supported by said bomb, a booster charge arranged within said casing, a releasable arming rotor supported within said casing in an initial safe position and adapted to be rotated a predetermined distance to an armed position, a pull rope detachably secured to and wrapped around said arming rotor for rotating the rotor from said initial safe position to the armed position, a frangible pin for securing said pull rope to the arming rotor and constructed and arranged to be severed and to detach the pull rope from the rotor as the rotor moves to said armed position, means for releasably maintaining said arming rotor in safe position, means for locking the arming rotor in said armed position, electroresponsive means arranged in said arming rotor and adapted to fire said booster charge, and means secured to said casing and including a pair of electrical conductors arranged within said arming rotor and connected to said electroresponsive means for providing a firing connection to the electroresponsive means.

3. A fuze for a domolition bomb comprising a casing supported by said bomb, a booster charge arranged within said casing, a releasable arming member supported within said casing in an initial safe position and having a channel arranged in one end thereof, means for maintaining said arming member in a safe position, means for locking said arming member in an armed position, a pull rope secured to said arming member and arranged within said channel for rotating said arming member from said safe position to the armed position, a pin for securing said pull rope to said arming member and adapted to be sheared in response to pressure exerted thereon after the arming member has been moved to said armed position, an arcuate shield secured to said casing in proximate spaced relation to said channel for maintaining said pull rope within the channel until the arming member has been moved to the armed position, electroresponsive means arranged within said arming member and adapted to fire said booster charge, and means secured to said casing and including a pair of electrical conductors arranged within said arming member and connected to said electroresponsive means for providing a firing connection to the electroresponsive means.

4. A fuze for a demolition bomb comprising a casing supported within said bomb, a releasable arming member supported within said casing in an initial safe position and adapted to be rotated a predetermined distance to an armed position a pull rope secured to and wrapped around said arming member for rotating the arming member from said initial safe position to the armed position, means secured to said casing for maintaining the pull rope wrapped around

said arming member until the member is moved to the armed position, a pin for securing said pull rope to the arming member and constructed and arranged to be sheared in response to pressure exerted thereon as the member moves into said armed position, means for releasably maintaining said arming member in the safe position, means for locking the arming member in said armed position, electroresponsive means arranged within said arming member, means secured to said casing and including a pair of electrical conductors connected to said electroresponsive means for providing a firing connection to the electroresponsive means, a sensitive primer arranged within said arming member in abutting relation with respect to said electroresponsive means and adapted to be fired thereby, a lead-in charge arranged within said casing and adapted to be fired by said sensitive primer when the arming member has been rotated to the armed position, and a booster charge arranged within said casing in operative relation with said lead-in charge and adapted to be fired by the lead-in charge and thereby initiate explosion of said demolition bomb.

5. A fuze for a demolition bomb comprising a casing supported within said bomb, a booster charge arranged within said casing, a releasable arming member supported within the casing in an initial safe position and having a channel circumferentially arranged therein, means for releasably maintaining said arming member in safe position, means in said casing for locking said arming member in an armed position, a flexible member secured to said arming member and arranged within said channel for rotating the arming member from said safe position to the armed position, means secured to said arming member and adapted to engage a stop member on said casing to limit the rotation of said arming member, means for securing said flexible member to said arming member, said last named means being adapted to be sheared in response to pressure exerted thereon after the arming member has been rotated to said armed position, means secured to said casing for maintaining said flexible member within said channel until the arming member has been rotated to the armed position, an electroresponsive detonator arranged within said arming member and adapted to fire said booster charge, a socket member secured to said casing adjacent said arming member, a pair of slip connections disposed within said socket member and secured thereto, and a pair of electrical conductors connected to said slip connections and to said detonator for providing a firing connection to the detonator.

6. A fuze for a demolition bomb comprising a casing supported by said bomb, a releasable arming member supported within the casing in an

initial safe position, a groove arranged in one end of said arming member, means for maintaining the arming member in said safe position, a flexible element secured to the arming member and disposed within said groove for rotating the arming member from said safe position to an armed position, a shield secured to the casing for maintaining the flexible element within the groove until the arming member has been moved to the armed position, a frangible member for securing said flexible element to the arming member and constructed and arranged to be severed and to detach said flexible element from the arming member in response to pressure exerted thereon as the arming member moves to said armed position, and means including an electroresponsive detonator disposed within the arming member for exploding said bomb when the arming member is in said armed position.

7. A fuze for a demolition bomb comprising a casing supported within said bomb, a releasable arming member rotatably supported within the casing in an initial safe position and having a circumferentially arranged groove therein, a flexible member detachably secured to and normally wound around said arming member within said groove for rotating the arming member from said safe position to an armed position as the flexible element is unwound therefrom, a pin secured to the arming member and adapted to engage a stop member on said casing for limiting the rotation of the arming member to said armed position, means for detachably securing the flexible member to the arming member and constructed and arranged to be sheared in response to pressure exerted thereon when said flexible member has been unwound and said pin engages the stop member thereby to detach the flexible member from the arming member, means secured to the casing for maintaining the flexible element within the groove until the arming member has been rotated to the armed position, and means including an electroresponsive detonator disposed within the arming member for exploding said bomb when the arming member is in said armed position.

JOHN M. WHEELER.

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