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3,101,055

DISPOSABLE BOMB ARMING DEVICE

Filed Feb. 28, 1962

2 Sheets-Sheet 1

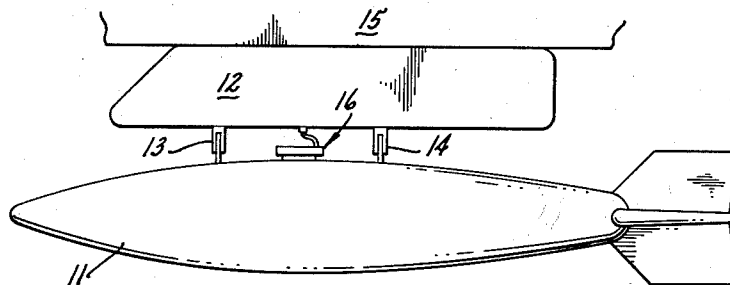


fig. 1.

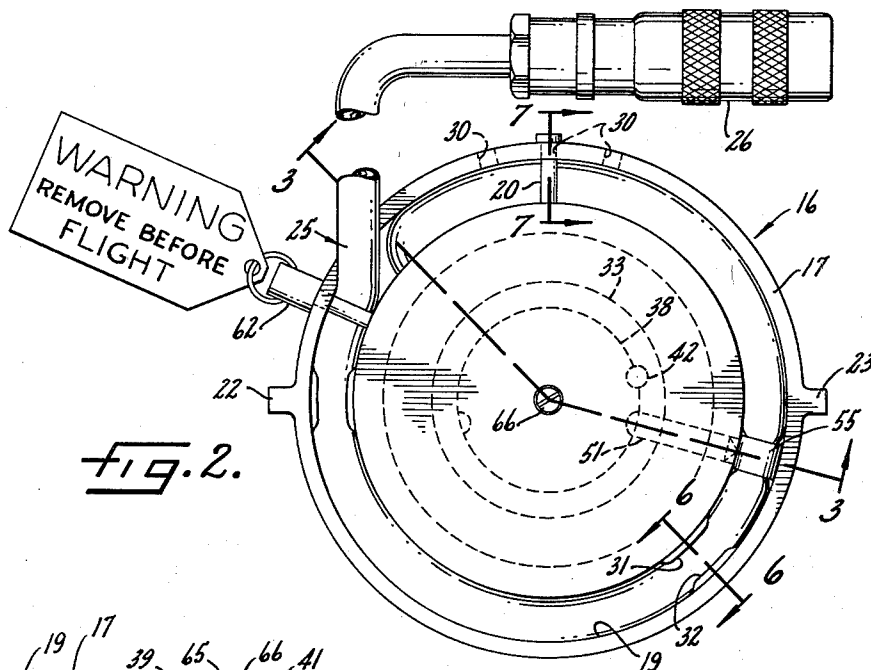


fig. 2.

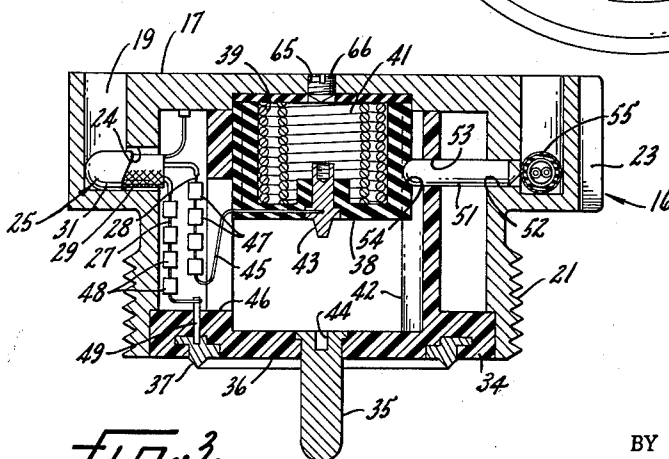


fig. 3.

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2 Sheets-Sheet 2

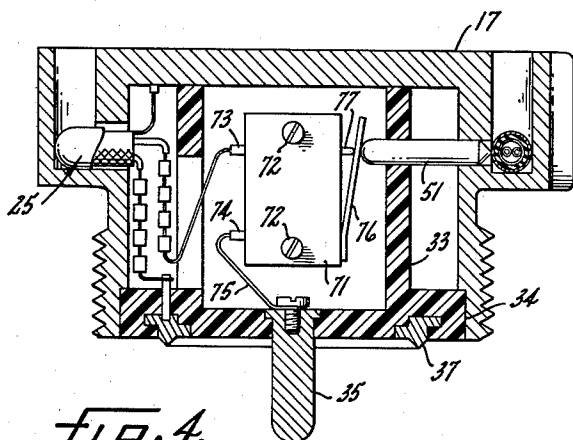


fig. 4.

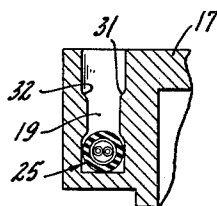


fig. 6.

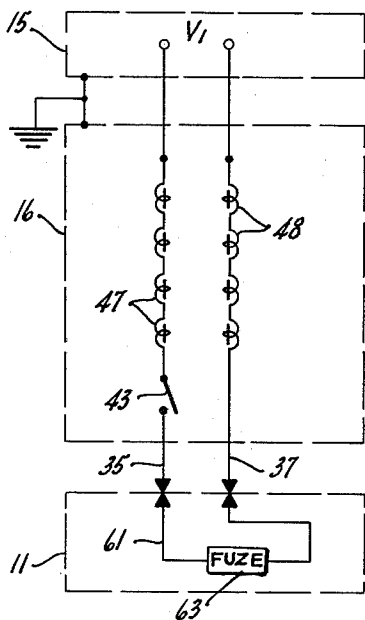


fig. 5.

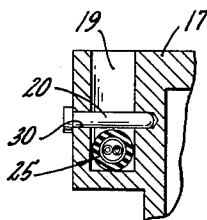


fig. 7.

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DISPOSABLE BOMB ARMING DEVICE

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5 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 arming device and more particularly to a disposable bomb arming device that is used for electrically arming a bomb after it is launched from an aircraft.

For safety reasons, it is the practice to delay the arming of a bomb until it starts its travel away from the aircraft that is carrying the bomb. As most present day bombs are electrically armed, it is therefore necessary to have an electrical connection between the aircraft and the fuse in the bomb during part of the downward travel of the bomb. After the bomb has traveled a short distance, a switch is normally automatically closed and an electrical impulse is then received by the bomb fuse to arm the bomb. After the bomb has been armed, the electrical cable connecting the bomb and the aircraft separates and either travels with the bomb, or is retracted into the aircraft.

One type of commonly used bomb arming device is shown and described in U.S. Patent 2,918,845, entitled, "Electric Arming Device." In this type of arming device, the arming cable is stowed by forming numerous bends to occupy a stowage space substantially shorter than the straight length of the stowed portion. After the arming cable is played-out a certain distance, switching means connect the bomb with a voltage source to arm the bomb. After an additional short travel, during which time a voltage is being applied to arm the bomb, the cable separates from the bomb and is carried by the aircraft.

While heretofore available bomb arming devices, such as the one shown and described in the above-mentioned patent, adequately arm bombs, they are, nevertheless, inadequate, as the amount of energy being radiated by electronic equipment, such as radar and radio gear, has become so great that this radiant energy can arm the bomb. The devices of the type shown in the above-mentioned patent are particularly vulnerable to radiant energy as the folded arming cable acts as an antenna.

The bomb arming device of the present invention is threadedly attached to a bomb and contains a circular channel or groove on the top that holds the arming cable. The channel is provided with projecting lugs that help retain the arming cable within the groove. A single pole switch is provided within the casing of the arming device and is actuated by the movement of a pin that is retained by the arming cable portion that is within the channel. When the arming cable is withdrawn from the channel, the pin is moved outwardly and actuates a switch which closes a circuit to energize the arming unit in the bomb. Means are provided for increasing or decreasing the length of the arming cycle by the use of a pin which can be inserted into one of a plurality of slots to retain the arming cable within the circular channel.

In the present invention, the bomb arming device is designed to use an isolated signal return in order to prevent electromagnetic currents on the outer skin of the bomb from inadvertently firing the squibs in the fuse. When the bomb arming device is installed in a bomb and the bomb latched to an aircraft bomb rack, the quick dis-

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nect connector on the arming device is mated to the electrical connector on the bomb rack after the bomb has reached the same potential as the aircraft. The two outer shells of the connectors are mated together before the connector pins become in contact, and therefore no arcing through the connector pins will occur when plugging-in the arming device.

It is therefore a general object of the present invention to provide an inexpensive disposable bomb arming device.

Another object of the present invention is to provide a bomb arming device that is not affected by radiant energy.

Still another object of the present invention is to provide a bomb arming device that provides adjustable arming cycles.

Other objects and advantages of the present 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:

FIGURE 1 is a side view showing a bomb carried by a bomb rack;

FIGURE 2 is a top view of the present invention;

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

FIGURE 4 is a sectional view similar to FIGURE 3 except showing another embodiment of the present invention;

FIGURE 5 is a schematic wiring diagram;

FIGURE 6 is a sectional view taken on line 6—6 of FIGURE 2; and

FIGURE 7 is a sectional view taken on line 7—7 of FIGURE 2.

Referring now to the drawings, FIGURE 1 shows a bomb 11 that is carried by a bomb rack 12 by means of shackles 13 and 14. The bomb rack 12, which is carried by an aircraft 15, is electrically connected to the bomb 11 by means of the bomb arming device 16.

A first embodiment of the present invention is illustrated in FIGURES 2 and 3 of the drawings, wherein there is shown a casing 17 having a cavity 18 in one end and a circular channel or groove 19 in the other end. A portion of the outer periphery of casing 17 is provided with threads 21 that engage with the threads in a receptacle well of a bomb 11. Two lugs 22 and 23 are provided on the outer periphery of the casing 17 which accommodate a spanner wrench for tightening casing 17 in the receptacle well of a bomb. A passageway 24 connects cavity 18 with the circular channel 19, and an arming cable 25, that is retained in channel 19, passes through passageway 24 and has one end terminated within cavity 18. The other end of arming cable 25 is attached to connector 26. Arming cable 25, which by way of example, is comprised of electrical conductors 27 and 28, shield 29, and outer elastic covering 31, is retained in channel 19 by restrictions which are formed by projections 31 and 32 on the sides of the channel walls, as shown in FIGURE 6 of the drawings. Arming cable 25 is also retained in groove 19 by pin 20 which is fitted in one of a group of holes 30, as best shown in FIGURE 7 of the drawings.

Referring particularly to FIGURE 3 of the drawings, there is shown a cylinder 33 which is provided with a flange portion 34 that engages with the inner wall of casing 17. Cylinder 33 is comprised of insulating material and flange portion 34 is attached to casing 17 by press-fitting, cementing, or any other suitable means. A signal input pin 35 is attached to the bottom portion 36 of cylinder 33 and a ground return ring 37 is attached to flange portion 34. Both the signal input pin 35 and the ground return ring 37 make electrical contact with contacts located in the bomb 11, as shown in FIGURE 5 of the

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drawings, when the bomb arming unit 16 is threaded into the receptacle well of the bomb.

A cylindrical piston 38 is provided within cavity 18 and a compression spring 39 is seated inside the bore 41 of piston 38 in order to drive the piston downwardly. A guide rod 42 is provided on cylinder 33 for preventing rotation of piston 38. A tapered contact 43 is provided on the bottom of piston 38 and is adaptable for engaging with a hole 44 in the signal input pin 35. Tapered contact 43 is connected to electrical conductor 28 through lead 45, which passes through slit 46 in cylinder 33, and through a plurality of attenuators 47. The other conductor 27 in cable 25 is connected through a plurality of attenuators 48 to pin 49 which is electrically connected to the ground return ring 37. A pin 51 is retained in hole 52 in casing 17 and hole 53 in cylinder 33 and engages with a detent 54 in piston 38. Pin 51 is retained in position by a ferrule 55 which is provided on arming cable 25.

In operation of the embodiment shown in FIGURES 2 and 3 of the drawings, the casing 17 is threadably engaged in the receptacle well of a bomb 11 and the signal input pin 35 and ground return ring 37 make electrical contact with the arming fuse circuit 61 which is located in the bomb 11. Arming cable 25 is positioned in groove 19 and pin 20 is selectively placed in one of the holes 30. Also a safety pin 62 is provided to prevent the accidental removal of the arming cable 25 from groove 19. Cylindrical piston 38 is in a raised position and is maintained in this position by pin 51 which is prevented from moving by arming cable 25. After the bomb 11 is hooked into the bomb rack 12, connector 26 is coupled with a mating connector that is in the aircraft, and safety pin 62 is removed.

Immediately prior to release of the bomb 11, a voltage V_1 is applied at the connector 26. As the bomb 11 is released from the bomb rack, arming cable 25 begins to pull out of groove 19 due to the fact that connector 26 is still attached to a mating connector in the aircraft. When the portion of the arming cable 25 containing the ferrule 55 leaves the groove 19, the force of spring 39 pushes pin 51 laterally and then spring 39 drives piston 38 downwardly so that tapered contact 43 engages hole 44 in the signal input pin 35. When contact 43 engages pin 35 the electrical circuit is complete and the current from voltage source V_1 arms the fuse 63 in bomb 11. The flow of current is as follows: From voltage source V_1 through lead 28 in arming cable 25, through attenuators 47, through contact 43 and pin 35 and then to the fuse 63. The return circuit is from fuse 63, through ground return ring 37, through pin 49, through attenuators 48, and then through lead 27 in arming cable 25 and back to the voltage source V_1 .

When contact 43 engages the signal input pin 35, the current from voltage source V_1 flows through fuse 63, and arming cable 25 continues to be pulled out from groove 19 in a counterclockwise motion, as viewed in FIGURE 2 of the drawings. However, when the portion of the arming cable beneath pin 20 starts to pull out of groove 19, pin 20 prevents any further pulling out, and connector 26 is separated from the mating connector in the aircraft. It can be seen that from the time contact 43 engages signal input pin 35 until the time that connector 26 separates from the mating connector in the aircraft, voltage source V_1 is connected across fuse 63 in bomb 11. It should therefore now be obvious to those skilled in the art that by selectively placing pin 20 in different holes 30, the length of time that the fuse 63 is subjected to voltage V_1 can be changed.

Normally the bomb arming unit of the present invention is intended to be an expendable item and the switch will be actuated only one time, however, means are provided for resetting the switch shown in FIGURE 3 of the drawing. As access hole 65 is provided in the top of casing 17 and is normally closed by screw 66. When screw 66 is removed, a rod, which is threaded on one

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end, can be inserted through hole 65 and threadably engaged with the top of contact 43. Piston 38 can then be raised and the arming unit can be reset.

Referring now to FIGURE 4 of the drawings, another embodiment of the present invention is shown that employs a snap-action switch 71 that, when actuated, completes the circuit from voltage source V_1 through fuse 63. Switch 71, which is a normally-closed switch is attached inside casing 17 by screws 72. One switch terminal 73 is connected to conductor 28, and a second switch terminal 74 is connected through lead 75 to the signal input pin 35. Pin 51, when in position, pushes against lever actuator 76 which, in turn, depresses pin plunger 77. Pin 51 is held in position by ferrule 55 which is on arming cable 25.

In operation, switch 71, which is a normally-closed switch, is held open by pin 51 which depresses pin plunger 77 through lever actuator 76. When arming cable 25 is removed from channel 19, the spring force of lever actuator 76 moves pin 51 laterally outwardly and pin plunger 77 is actuated to close the circuit between voltage source V_1 and fuse 63.

It can thus be seen that the present invention provides an improved bomb arming device that is not adversely affected by radiant energy. 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 is:

1. A disposable bomb arming unit comprising:

- (a) a casing having a cavity in one end and a circular channel in the other end,
- (b) an electrically insulated base plate closing said cavity,
- (c) a first electrical conductor attached to said base plate,
- (d) a second electrical conductor slidably mounted within said cavity,
- (e) a flexible arming cable having one end connected to said second electrical conductor and having a portion of its length stowable in said circular channel, and
- (f) means engaging said flexible arming cable for separating said first electrical conductor from said second electrical conductor when said flexible arming cable is stowed in said circular channel.

2. A disposable bomb arming unit as set forth in claim 1 wherein said channel is provided with at least one restriction for facilitating the retention of said flexible arming cable.

3. A disposable bomb arming unit comprising:

- (a) a casing having a cavity in one end and a circular channel in the other end,
- (b) an electrically insulated base plate closing said cavity,
- (c) a first electrical conductor attached to said base plate,
- (d) a piston slidably mounted in said cavity,
- (e) a second electrical conductor attached to said piston,
- (f) a flexible arming cable having one end connected to said second electrical conductor and having a portion of its length stowable in said circular channel, and
- (g) a pin having one end engaging said piston and the other end engaging said flexible arming cable whereby movement of said piston is prevented while said flexible arming cable is stowed in said circular channel.

4. A disposable bomb arming unit comprising:

- (a) a casing having a cavity in one end and a circular channel in the other end,

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- (b) an electrically insulated base plate closing said cavity,
 - (c) a first electrical conductor attached to said base plate,
 - (d) a piston slidably mounted in said cavity, 5
 - (e) a second electrical conductor attached to said piston,
 - (f) a flexible arming cable having one end connected to said second electrical conductor and having a portion of its length stowable in said circular channel, 10
 - (g) a pin having one end engaging said piston and the other end engaging said flexible arming cable whereby movement of said piston is prevented while said flexible arming cable is stowed in said circular channel, and 15
 - (h) means for adjustably locking different portions of said flexible arming cable in said circular channel.
5. A disposable bomb arming unit comprising:
- (a) a casing having a cavity in one end and a circular channel in the other end, 20
 - (b) an electrically insulated base plate closing said cavity,
 - (c) a first electrical conductor attached to said base plate,

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- (d) a piston slidably mounted in said cavity,
- (e) spring means engaging said piston for driving said piston,
- (f) a second electrical conductor attached to said piston,
- (g) a flexible arming cable having one end connected to said second electrical conductor and having a portion of its length stowable in said circular channel,
- (h) a pin having one end engaging said piston and the other end engaging said flexible arming cable whereby movement of said piston is prevented while said flexible arming cable is stowed in said circular channel, and
- (i) means for adjustably locking different portions of said flexible arming cable in said circular channel.

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