

April 10, 1962

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3,028,809

MULTIPLE DETONATOR OPERATION

Original Filed March 13, 1952

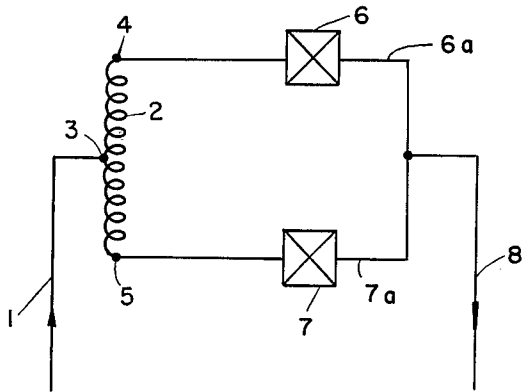


FIG. 1

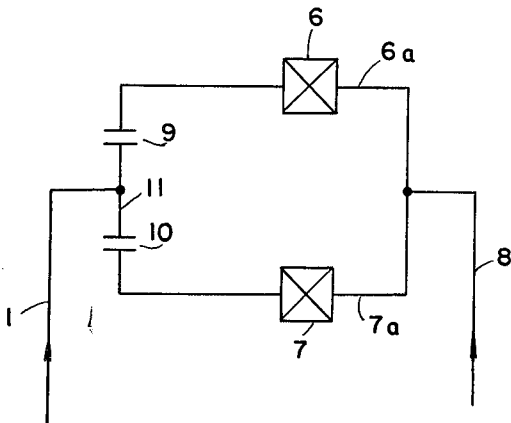


FIG. 2

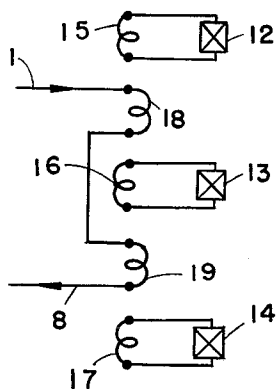


FIG. 3

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MULTIPLE DETONATOR OPERATION

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Original application Mar. 13, 1952, Ser. No. 276,433, now Patent No. 2,921,522, dated Jan. 19, 1960. Divided and this application Aug. 31, 1959, Ser. No. 837,302

1 Claim. (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 for governmental purposes without the payment to me of any royalty thereon.

In order to insure that proximity and/or electrical types of fuses employed in artillery projectiles, guided missiles and the like shall function despite a defective detonator, it is desirable that two or more detonators be used and so arranged that both may fire or that either will fire if the other is short circuited or open circuited. To this end, the novel circuitry of the invention hereinafter described has been devised.

Multiple detonator firing is accomplished by introducing a plurality of coupled isolating impedance elements in series with each of the detonators. This prevents one detonator from short-circuiting the others. As will become apparent, either inductance or capacitance may be used as the isolating impedance, although inductance is to be preferred.

Another object of the invention is a novel circuit means whereby positive functioning of electrically actuated detonators in proximity fuses or other detonator functioned devices is insured.

Another object of the invention is means whereby a multiplicity of detonators may be caused to fire or the remainder of detonators in the circuit may be fired irrespective of faulty detonators or connections thereto.

The specific nature of the invention as well as other objects and advantages thereof will clearly appear from the following description and accompanying drawings in which:

FIGURE 1 shows an embodiment of the invention whereby two detonators are functioned through an inductive means.

FIGURE 2 shows a modification of the circuit of the invention.

FIGURE 3 shows another modification of the invention.

Referring more particularly to the drawings wherein like reference characters designate the same parts throughout the drawings, number 1 indicates an electrical feed line of a proximity fuse or any electrical detonator exciter means, not shown, connected to the center tap 3 of a choke 2. One end terminal 4 of the choke is connected to a lead of detonator 6 and the opposite end terminal 5 to a lead of detonator 7. The remaining leads 6a and 7a of the detonators are joined in a common return line 8 of the exciter means. When a pulse of current is applied to the inductive means 2 through feed line 1, it will divide equally about the center tap 3 and will proportionately flow through detonators 6 and 7 to

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the return line 8. If, for example, detonator 6 is open circuited, all the current will flow through detonator 7. If, on the other hand, detonator 6 is short circuited, the current will pass in approximately equal amounts through the short circuited detonator 6 and the operating detonator 7 because of the negligible resistance of the detonators and thus cause detonator 7 to function.

In the modification shown in FIGURE 2, the electrical detonator firing circuit is substantially the same as that shown in FIGURE 1 with the exception that the series connected capacitors 9 and 10 have been substituted for the center tapped choke 2. In this modification the feed 1 line is connected to the series connector 11 in order to provide an equal amount of energy for the detonators.

Another system for insuring detonation of explosive missiles or the like is shown in FIGURE 3 wherein the detonators 12, 13 and 14 are connected across spaced coils 15, 16 and 17, respectively. Positioned in inductive relationship to coils 15 and 16 is a coil or link coupling 18 which is in series with a similar coil or link 19 positioned in inductive relationship between coils 16 and 17. The terminals of the series connected coils comprising link coupling means are connected across the feed line 1 and return line 8. In operation, a pulse of current is caused to flow in the link coupling means which in turn induces a current in each of the detonator shunted coils to function the detonators. It is apparent that irrespective of the fact that some detonators or circuits thereof may fail to function, detonation of the explosive missile in which the invention is incorporated may be obtained if but one detonator and circuit remain in operative condition.

It will be apparent that the embodiments shown are only exemplary and that various modifications can be made in construction and arrangement within the scope of the invention as defined in the appended claims.

This application is a divisional application of Multiple Detonator Operation, Serial No. 276,433, filed March 13, 1952, now Patent No. 2,921,522.

I claim as my invention:

A detonator firing circuit comprising electrical energy supply means including a feed line and a return line, a link coupling means having a plurality of spaced inductive links connected in series, said link coupling means connected to said supply means for receiving electrical impulses therefrom, and a plurality of series circuits each consisting of a coil and a detonator, all of said detonators being responsive to the same condition, each of said coils being closely coupled to one of said spaced inductive links so that the functioning of each of said detonators is independent of the response by the rest of said detonators.

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