place in a manner that it is safe once again and thus prevents full activation of the initiation chain. In a preferred embodiment of the system, in accordance with the invention, the typical period of time passing from the instant of receiving an indication from the second sensor until the initiation chain is executable, does not exceed 1 millisecond.

A system, in accordance with the invention, also embodies in its manner of operation a method for quick and selective arming of a detonation or excitation assembly. A method that comprises the step of providing a detonation or excitation assembly that comprises initiation chain components, first barrier means which prevents full activation of the initiation chain as long as it has not been removed, and whose removal is reversible to its safe state in a manner in which it will return to its initial place and once again prevent full activation of the initiation chain, and a second barrier means which also prevents full activation of the initiation chain as long as it has not been removed, and whose removal is irreversible from its now armed state in a manner that leaves the initiation chain executable, and the system is armed for detonation or excitation. The method comprises, in addition, a step of removing the first barrier means from the instant of receiving indication from at least one first sensor, and through electro-mechanic or electronic means. The method also comprises the step of removing the second barrier means from the instant of receiving indication from at least one second sensor, and this – following after receiving indication from the first sensor, and through pyrotechnic or mechanical means.

An aspect of the present disclosure provides a quick-arming excitation assembly, comprising:

an initiation chain comprising a first segment and at least one additional segment;

a slider comprising the first segment of the initiation chain and movable along a path, the slider movable between an on-line position wherein the first segment is aligned with the at least one additional segment along a common axis and the initiation chain is ready for full activation, and an off-line position wherein the first segment is separated from the common axis by a distance such that activation of one segment of the initiation chain is insufficient to cause full activation;

a first barrier; and

a second barrier;

wherein the quick-arming excitation assembly is movable between a safe state, a stand-by state, and an armed state;

wherein the safe state of the quick-arming excitation assembly comprises the slider in the off-line position and the first and second barriers positioned on the path such that movement of the slider into the on-line position is blocked by the first and second barriers;

wherein the stand-by state of the quick-arming excitation assembly comprises the slider in the off-line position, the first barrier outside of the path, the second barrier in the path such that movement of the slider into the on-line position is blocked by the second barrier;

wherein the armed state of the quick-arming excitation assembly comprises the slider in the on-line position, the first barrier outside of the path;

wherein the quick-arming excitation assembly is reversibly movable between the safe state and the stand-by state; and

wherein the quick-arming excitation assembly can be irreversibly driven from the stand-by state to the armed state once.

Another aspect of the present disclosure provides a quick-arming excitation assembly system, comprising:

a first sensor;

a second sensor;

at least one quick-arming excitation assembly, each comprising:

an initiation chain comprising a first segment and at least one additional segment;

a slider comprising the first segment of the initiation chain and movable along a path, the slider movable between an on-line position wherein the first segment is aligned with the at least one additional segment along a common axis and the initiation chain is ready for full activation, and an off-line position wherein the first segment is separated from the common axis by a distance such that activation of one segment of the initiation chain is insufficient to cause full activation;

a first barrier; and

a second barrier;

and a central control communicatively coupled to the first sensor, the second sensor, and the at least one quick-arming excitation assembly;

wherein each of the at least one quick-arming excitation assembly is movable between a safe state, a stand-by state, and an armed state;

wherein the safe state of each quick-arming excitation assembly comprises the slider in the off-line position and the first and second barriers positioned on the path such that movement of the slider into the on-line position is blocked by the first and second barriers;

wherein the stand-by state of each quick-arming excitation assembly comprises the slider in the off-line position, the first barrier outside of the path, the second barrier in the path such that movement of the slider into the on-line position is blocked by the second barrier;

wherein the armed state of each quick-arming excitation assembly comprises the slider in the on-line position, the first barrier outside of the path;

wherein each quick-arming excitation assembly is reversibly movable between the safe state and the stand-by state; and

wherein the quick-arming excitation assembly can be irreversibly driven from the stand-by state to the armed state once.

Still other aspects, embodiments, and advantages of these exemplary aspects and embodiments are discussed in detail below. Embodiments disclosed herein may be combined with other embodiments in any manner consistent with at least one of the principles disclosed herein, and references to "an embodiment," "some embodiments," "an alternate embodiment," "various embodiments," "one embodiment" or the like are not necessarily mutually exclusive and are intended to indicate that a particular feature, structure, or characteristic described may be included in at least one embodiment. The appearances of such terms herein are not necessarily all referring to the same embodiment.

CLAIMS

1. A quick-arming excitation assembly, comprising:

an initiation chain comprising a first segment and at least one additional segment;

a slider comprising the first segment of the initiation chain and movable along a path, the slider movable between an on-line position wherein the first segment is aligned with the at least one additional segment along a common axis and the initiation chain is ready for full activation, and an off-line position wherein the first segment is separated from the common axis by a distance such that activation of one segment of the initiation chain is insufficient to cause full activation;

a first barrier; and

a second barrier;

wherein the quick-arming excitation assembly is movable between a safe state, a stand-by state, and an armed state;

wherein the safe state of the quick-arming excitation assembly comprises the slider in the off-line position and the first and second barriers positioned on the path such that movement of the slider into the on-line position is blocked by the first and second barriers;

wherein the stand-by state of the quick-arming excitation assembly comprises the slider in the off-line position, the first barrier outside of the path, the second barrier in the path such that movement of the slider into the on-line position is blocked by the second barrier;

wherein the armed state of the quick-arming excitation assembly comprises the slider in the on-line position, the first barrier outside of the path;

wherein the quick-arming excitation assembly is reversibly movable between the safe state and the stand-by state; and

wherein the quick-arming excitation assembly can be irreversibly driven from the stand-by state to the armed state once.

2. The quick-arming excitation assembly of claim 1, wherein the second barrier is a shear pin, and wherein moving from the stand-by state to the armed state comprises shearing the second barrier.

3. The quick-arming excitation assembly of claim 1, further comprising a solenoid coupled to the first barrier, wherein the activation of the solenoid with an electric charge drives the assembly from the safe state to the stand-by state by moving the first barrier out of the path.

4. The quick-arming excitation assembly of claim 3, further comprising a return spring coupled to the solenoid and biasing the assembly toward the safe state such that when the electric charge is removed the first barrier is driven back into the path by the return spring and the assembly is driven back into the safe state.

5. The quick-arming excitation assembly of claim 3, wherein the solenoid is a rotary solenoid.

6. The quick-arming excitation assembly of claim 1, further comprising a pyrotechnic thrust unit that is electrically powered and positioned along the path and configured to thrust the slider from the off-line position to the on-line position and irreversibly drive the assembly from the stand-by state to the armed state.

7. The quick-arming excitation assembly of claim 6, wherein the armed state further comprises a front end of the slider deformed and trapped inside a housing, maintaining the slider in the on-line position.

8. The quick-arming excitation assembly of claim 6, wherein the pyrotechnic thrust unit is configured to irreversibly drive the assembly from the stand-by state to the armed state in less than 1 millisecond.

9. A quick-arming excitation assembly system, comprising:

a first sensor;

a second sensor;

at least one quick-arming excitation assembly, each comprising:

an initiation chain comprising a first segment and at least one additional segment;

a slider comprising the first segment of the initiation chain and movable along a path, the slider movable between an on-line position wherein the first segment is aligned

with the at least one additional segment along a common axis and the initiation chain is ready for full activation, and an off-line position wherein the first segment is separated from the common axis by a distance such that activation of one segment of the initiation chain is insufficient to cause full activation;

a first barrier; and

a second barrier;

and a central control communicatively coupled to the first sensor, the second sensor, and the at least one quick-arming excitation assembly;

wherein each of the at least one quick-arming excitation assembly is movable between a safe state, a stand-by state, and an armed state;

wherein the safe state of each quick-arming excitation assembly comprises the slider in the off-line position and the first and second barriers positioned on the path such that movement of the slider into the on-line position is blocked by the first and second barriers;

wherein the stand-by state of each quick-arming excitation assembly comprises the slider in the off-line position, the first barrier outside of the path, the second barrier in the path such that movement of the slider into the on-line position is blocked by the second barrier;

wherein the armed state of each quick-arming excitation assembly comprises the slider in the on-line position, the first barrier outside of the path;

wherein each quick-arming excitation assembly is reversibly movable between the safe state and the stand-by state; and

wherein the quick-arming excitation assembly can be irreversibly driven from the stand-by state to the armed state once.

10. The quick-arming excitation assembly system of claim 9, wherein the first sensor is a long range sensor, and the second sensor is a short range sensor having a range shorter than the first sensor.

11. The quick-arming excitation assembly system of claim 10, wherein the first sensor is radar, and the second sensor is an array of photoelectric cells.

12. The quick-arming excitation assembly system of claim 10, wherein at least one of the at least one quick-arming excitation assembly is driven from the safe state to the stand-by

state by the central control in response to the reception of a first signal from the first sensor, and further driven from the stand-by state to the armed state in response to the reception of a second signal from the second sensor after the reception of the first signal from the first sensor.

13. The quick-arming excitation assembly system of claim 10, further comprising a capacitor communicatively coupled to the thrust unit of each of the at least one assembly, through the central control, wherein the central control begins charging the capacitor in response to the receipt of a first signal from the first sensor, and wherein at least one thrust unit is activated by the capacitor in response to the receipt of a second signal from the second sensor.

14. The quick-arming excitation assembly system of claim 9, wherein, for each of the at least one assembly, the second barrier is a shear pin, and wherein moving from the stand-by state to the armed state comprises shearing the second barrier.

15. The quick-arming excitation assembly system of claim 14, each of the at least one assembly further comprising a return spring coupled to the solenoid and biasing the assembly toward the safe state such that when the electric charge is removed the first barrier is driven back into the path by the return spring and the assembly is driven back into the safe state.

16. The quick-arming excitation assembly system of claim 14 wherein, for each of the at least one assembly, the solenoid is a rotary solenoid.

17. The quick-arming excitation assembly system of claim 9, each of the at least one assembly further comprising a solenoid coupled to the first barrier, wherein the activation of the solenoid with an electric charge drives the assembly from the safe state to the stand-by state by moving the first barrier out of the path.

18. The quick-arming excitation assembly system of claim 9, each of the at least one assembly further comprising a pyrotechnic thrust unit that is electrically powered and positioned along the path and configured to thrust the slider from the off-line position to the on-line position and irreversibly drive the assembly from the stand-by state to the armed state.

19. The quick-arming excitation assembly system of claim 18 wherein, for each of the at least one assembly, the armed state further comprises a front end of the slider deformed and trapped inside a housing, maintaining the slider in the on-line position.

20. The quick-arming excitation assembly system of claim 18 wherein, for each of the at least one assembly, the pyrotechnic thrust unit is configured to irreversibly drive the assembly from the stand-by state to the armed state in less than 1 millisecond.