ammunition fuses. In general, safety pins include two sections, the first section consists of a curved section and the second section consists of a straight section. In this context, the two safety pin designs differ from each other in the first section of the bomb fuse. For example, in the DM111A5, the curve portion amounts to a helical-type curvature which wraps the fuse body in a downward spiral. Conversely, in the DM93 fuse, owing to the presence of a timer dial on the fuse, the curve portion of its safety pin is curved around the fuse body in the horizontal plane and attached the straight section of the safety pin through a flexible ring joint. Both mortar fuse safety pins are constructed out of spring steel which provides for certain elasticity when deformed.

[0089] To arm the mortar ammunition by removing the safety pin from the fuse assembly, a two-stage process is required to be performed. The safety pin must first be dislodged from the fuse body. This is done by pulling the first curved section of the safety pin away from the fuse body. Thereafter, by pulling the safety pin radially away from the fuse body, the entire safety pin can be extracted from the fuse. This arms the mortar ammunition to enable the explosives to detonate when it reaches its intended target.

[0090] FIG. 6A and **FIG. 6B** depict a bomb fuse **130** and a safety pin **132** wrapped around the bomb fuse **130**, respectively. **FIG. 6C** and **FIG. 6D** depict alternative views of the bomb fuse **140** and a safety pin **142** wrapped around the bomb fuse **430**, respectively. **FIG. 7A** and **FIG. 7B** also depict examples of bomb fuses **150** and a safety pin **152** wrapped around the bomb fuse **150**. **FIG. 7C** and **FIG. 7D** depict alternative views of the bomb fuse **160** and a safety pin **162** wrapped around the bomb fuse **160. FIG. 6A** and **FIG. 6C** depict the DM111A5 type bomb fuse and **FIG. 7A** and **FIG. 7C** depict the DM93 type bomb fuse. **FIG. 6A** and **FIG. 6C** depict the spiral-type safety pin used with the device **100** of **FIG. 1**, while **FIG. 7A** and **FIG. 7C** depict the horizontal-type safety pin used with the device **200** of **FIG. 9.**

[0091] FIG. 8A is a perspective view of a bomb fuse **150** with the safety pin **152** showing the process of removing the safety pin from around the bomb fuse. After lowering the pin removal unit on the bomb fuse **150**, the rotary unit rotates the wedge profile such that the curve portion **153** slides out and a straight section **151** remains

CLAIMS

What is claimed is:

1. A device for removing a safety pin from a bomb fuse on a mortar bomb comprising:

a pin removal unit in contact with the bomb fuse;

a rotary unit connected to the pin removal unit via a shaft, wherein the rotary unit rotates the pin removal unit to a predetermined position;

a first driving unit to engage or disengage the pin removal unit with the bomb fuse by moving the rotary unit, the shaft and the pin removal unit to a preset distance towards or away from the bomb fuse; and

wherein the pin removal unit comprises:

at least one bush connected to the shaft;

a wedge profile in contact with the safety pin of the bomb fuse; and

at least one spring-loaded joint positioned between the bush and the wedge profile, wherein the spring-loaded joint holds the wedge profile to the shaft and transmits torque from the rotary unit to the wedge profile,

wherein the wedge profile comprises a protrusion, the protrusion comprises a defined angled surface;

a contact surface to rest on a surface of the bomb fuse and wedge under the safety pin; and

an angled surface on which the safety pin slides when the first driving unit moves the pin removal unit and engages with the bomb fuse,

wherein rotation of the rotary unit dislodges the safety pin from the bomb fuse.

2. The device of claim 1, wherein the wedge profile has a first protrusion to drive the safety pin away from the bomb fuse during the rotation by the rotary unit.

3. The device of claim 1 further comprising a second driving unit to pull the safety pin out from the bomb fuse after the pin removal unit is rotated to the predetermined position.

4. The device of claim 3, wherein the wedge profile has a first provisioned hole to engage the safety pin and pull the safety pin out from the bomb fuse.

5. The device of claim 4, wherein the wedge profile comprises a second protrusion to prevent the safety pin from springing away from the bomb fuse based on the rotation of the safety pin unit.

6. The device of claim 5, wherein the second protrusion has at least one guide to engage the safety pin during rotation.

7. The device of claim 1, wherein the wedge profile comprises a third protrusion to engage the safety pin.

8. The device of claim 1, wherein a disk-shaped guide is attached to a lowering arm.

9. The device of claim 7, wherein the wedge profile is held in contact with the bomb fuse when lowered into the bomb fuse using a spring.

10. The device of claim 9, wherein the wedge profile further comprises a second provisioned hole to hold a tip portion of the safety pin.

11. The device of claim 10, wherein the wedge profile further comprises a vertically angled edge to pull the safety pin out of the bomb fuse through a vertical motion.

12. The device of claim 11, wherein the wedge profile has a pivot to rotate the wedge profile away from the bomb fuse.

13. The device of claim 12, wherein the wedge profile has a notch to secure the safety pin on the wedge.

14. The device of claim 1, wherein the first driving unit is a vertical driving unit.

15. The device of claim 3, wherein the second driving unit is a horizontal driving unit.

16. A method for removing a safety pin on a bomb fuse in a mortar system comprising steps of:

inserting, by an automatic mortar handling unit, a bomb into a tube assembly within a magazine of the mortar system;

lowering at a preset distance, by a first driving unit, a pin removal unit having at least one wedge profile;

allowing an angled surface of the wedge profile to rest on a surface of the bomb fuse;

engaging, by the first driving unit, the wedge profile on a surface of the bomb fuse; rotating at a predefined angle, by a rotary unit, a shaft and the pin removal unit, the rotary unit is to be connected to the top of the pin removal unit via the shaft to enable rotation,; and

dislodging the safety pin from the bomb fuse.

17. An automated system for removing a safety pin on a bomb fuse in a mortar system comprising:

a) a pin removal unit,

b) a rotary unit,

c) a first driving unit, and

d) a second driving unit,

wherein the rotary unit is connected to a top portion of the pin removal unit with a shaft;
wherein the rotary unit rotates the pin removal unit to a predetermined position;
wherein the first driving unit engages the pin removal unit with the bomb fuse by moving the rotary unit, the shaft and the pin removal unit to a preset distance toward the bomb fuse,
wherein the safety pin is removed by rotation of the pin removal unit by the second driving unit and

the pin removal unit comprising a wedge profile that contacts with the safety pin of the bomb fuse.

18. The automated system for removing a safety pin on a bomb fuse in a mortar system of claim 17, wherein the pin removal unit further comprises a wedge profile that contacts with the safety pin of the bomb fuse,
wherein a spring-loaded joint holds the wedge profile to the shaft and transmits torque from the rotary unit to the wedge profile,
wherein the wedge profile has an angled surface that engages with the bomb fuse; and
wherein rotation of the rotary unit dislodges the safety pin from the bomb fuse.

19. The automated system for removing a safety pin on a bomb fuse in a mortar system of claim 17, wherein the mortar system uses a DM111A5 type fuse.

20. The automated system for removing a safety pin on a bomb fuse in a mortar system of claim 17, wherein the mortar system uses a DM93 type fuse.

21. An automated method of removing a safety pin on a bomb fuse in a mortar system comprising steps of:
a) rotating the pin removal unit to a predetermined position using a rotary unit,
b) engaging a wedge profile on the pin removal unit with the bomb fuse by moving the rotary unit,
c) rotating the rotary unit to dislodge the safety pin from the bomb fuse,
wherein a spring-loaded joint holds the wedge profile to a shaft and transmits torque from the rotary unit to the wedge profile,
wherein the wedge profile has an angled surface that engages with the bomb fuse.

22. The automated method of removing a safety pin on a bomb fuse in a mortar system of claim 21,
wherein a second driving unit is used in the step of rotating the rotary unit to dislodge the safety pin from the bomb fuse.

23. The automated method of removing a safety pin on a bomb fuse in a mortar system of claim 21,
wherein a disk-shaped guide is used in the step of engaging a wedge profile on the pin removal unit with the bomb fuse by moving the rotary unit.

24. An automated method of removing a safety pin on a bomb fuse in a mortar system of claims 21-23 using the device of claim 1.