United States Patent [19]

Beach

[11] **3,908,553**

[45] **Sept. 30, 1975**

[54] **ANTI-RECOVERY DEVICE DISARMING MECHANISM**

[75] Inventor: **Eugene H. Beach,** Silver Spring, Md.

[73] Assignee: **The United States of America as represented by the Secretary of the Navy,** Washington, D.C.

[22] Filed: **Sept. 3, 1969**

[21] Appl. No.: **855,470**

[52] **U.S. Cl.** ..... **102/70.2 R**

[51] **Int. Cl.²** **F42C 11/00**

[58] **Field of Search** 102/70.2, 76, 16

[56] **References Cited**

UNITED STATES PATENTS

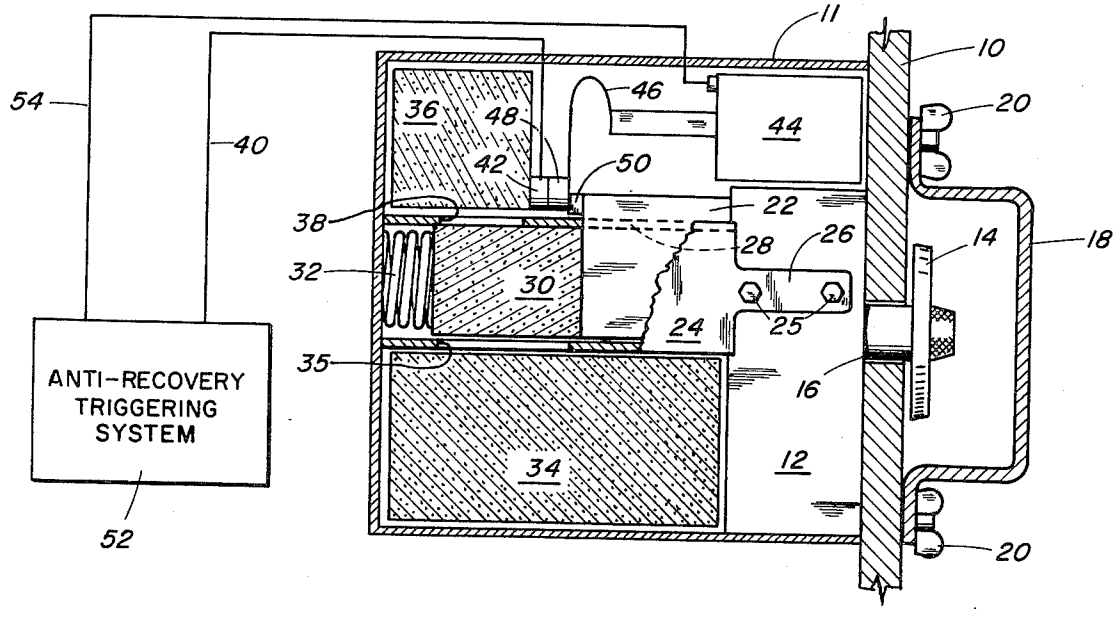
2,900,906	8/1959	Olsen	102/70.2 X
3,276,368	10/1966	Tower et al.	102/16
3,311,058	3/1967	Fohrmann et al.	102/70.2
3,345,947	10/1967	Combourieux	102/76
3,500,747	3/1970	Parker	102/70.2

Primary Examiner—Samuel Feinberg
Assistant Examiner—C. T. Jordan
Attorney, Agent, or Firm—R. S. Sciascia; J. A. Cooke

[57] **ABSTRACT**

A mechanism for disarming an anti-recovery device for a weapon by electrically and mechanically interrupting the firing system of the weapon. The mechanism includes a combination lock which extends and retracts a cam. A detonator is moved by the cam into and out of alignment in an explosive train as the lock is operated. Movement of the cam also closes or breaks a firing circuit which includes an anti-recovery triggering system. When the cam is retracted by unlocking the combination lock, the detonator is non-aligned in the explosive train, and the firing circuit is interrupted, rendering the anti-recovery triggering system ineffective.

4 Claims, 2 Drawing Figures



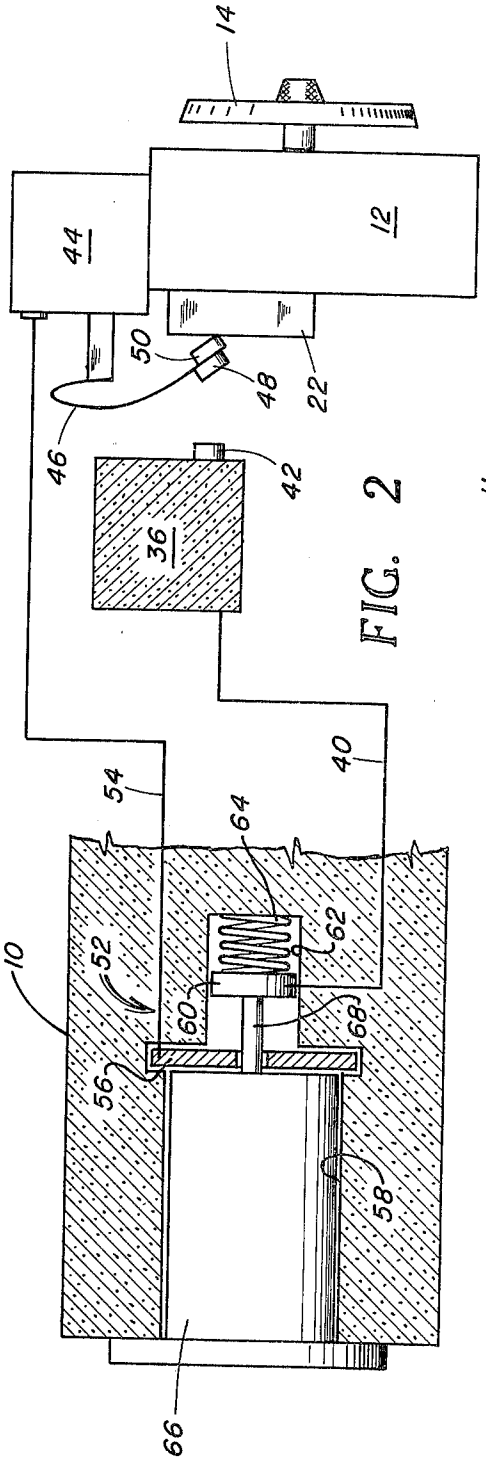


FIG. 2

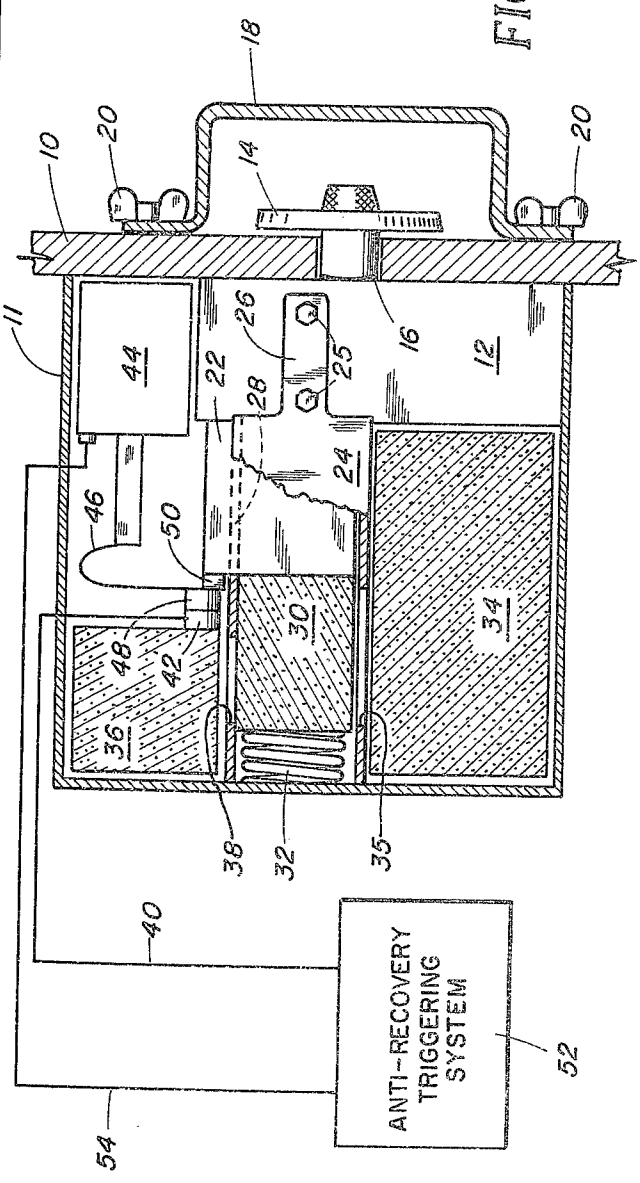


FIG. 1

INVENTOR
Eugene H. Beach

BY J. O. Tresansky
ATTORNEY

ANTI-RECOVERY DEVICE DISARMING MECHANISM

BACKGROUND OF THE INVENTION

This invention relates generally to disarming mechanisms, and more particularly to a disarming mechanism for an anti-recovery device for a weapon.

It has often occurred that enemy forces gain possession of ordnance devices deployed against them which have failed to explode. For example, air dropped bombs may fail to detonate on impact, or naval mines may become dislodged from their moorings and drift ashore on enemy held territory. These weapons are subsequently located by enemy personnel who search out such ordnance devices either as a source of reuseable explosive materials or to determine their modes of operation.

In either event, recovery of intact ordnance weapons by enemy forces is extremely undesirable. To prevent it, a wide variety of anti-recovery devices have been devised. For example, its has been suggested that bombs be equipped with detonating devices that are triggered if any attempt is made to disassemble them. In more sophisticated weapons, where the goal is to prevent the enemy from determining the technology of a firing system, it has been proposed that a small charge be included in the instrument compartment of each weapon to demolish the components of the firing system upon any attempt to remove it.

Despite the advantages of inclusion of such anti-recovery devices, ordnance designers have been reluctant to use them because of the hazard they pose to friendly forces. Consider, for example, the dilemma created by the return to base of an aircraft carrying an armed bomb which was not dropped because of a minor malfunction in the aircraft's dropping mechanism. If the bomb were equipped with an anti-recovery device, to remove it from the aircraft would be an extremely hazardous operation.

One solution to this problem is to include a disarming device in the anti-recovery mechanism. However, it will be appreciated that the purpose of including the anti-recovery device would be defeated if it could be easily rendered ineffective by enemy forces. Thus, an anti-recovery disarming device must be sufficiently sophisticated to prevent enemy personnel from easily deciphering its method of operation, yet be readily operable by friendly forces without the need for cumbersome tools or other equipment.

SUMMARY OF THE INVENTION

Accordingly, one object of this invention is to provide a disarming mechanism for use with a variety of anti-recovery devices.

Another object of this invention is the provision of an inexpensive, reliable disarming mechanism easily operated only by one possessing knowledge of its mode of operation.

Yet another object of the invention is to provide an anti-recovery device disarming mechanism operable without using tools.

Still another object of the invention is to provide a disarming mechanism for both electrically and mechanically disarming an anti-recovery device of a weapon.

Briefly, these and other objects are attained by a mechanism having a cam operated by a combination lock which selectively moves a detonator in and out of alignment in an explosive train and selectively opens and closes a firing circuit coupled to an anti-recovery triggering system.

BRIEF DESCRIPTION OF THE DRAWINGS

A more complete appreciation of the invention and many of the attendant advantages thereof will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in conjunction with the accompanying drawings wherein:

FIG. 1 is a cutaway side view of the anti-recovery device disarming mechanism of the instant invention; and

FIG. 2 is a cutaway side view of the anti-recovery triggering system coupled to the disarming mechanism of the instant invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings wherein like reference characters designate identical or corresponding parts throughout the several views, and more particularly to FIG. 1 thereof the anti-recovery disarming mechanism of the instant invention is shown mounted in the casing of an ordnance device **10**, such for example, as a bomb, missile, mine or the like.

The disarming device for a weapon **10** is enclosed in a protective casing **11** and includes a lock mechanism **12** to which a manually rotatable numbered wheel, or dial, **14** is coupled by means of a shaft **16.** The lock mechanism **12** is securely mounted within ordnance device **10** to be unaccessable from the exterior thereof unless the ordnance device is completely disassembled, thereby preventing unauthorized disarming. Shaft **16** passes through an opening in the wall of ordnance device **10** to permit dial **14** to be mounted exteriorly of device **10.** Lock mechanism **12,** dial **14** and shaft **16** together form a combination lock assembly which may be of conventional design. The lock is preferably of a rugged, reliable variety requiring at least a three digit combination to permit the operation thereof. It is also desirable that the lock include facilities allowing for periodical changing of the combination for added security.

A removable protective cover **18** is secured to the exterior of ordnance device **10** over the area occupied by dial **14.** The protective cover is preferably waterproof and is fastened to the device **10** in a readily removable manner, such as by means of a plurality of wing nuts **20.** The protective cover must be removed to gain access to numbered wheel **14.**

A cam **22** is slideably mounted in the rear of lock mechanism **12** and cooperates with the lock mechanism in a conventional manner. That is, the cam **22** is fully extended beyond the rear portion of mechanism **12** when the mechanism is in its "locked" condition, as shown in FIG. **1,** and is withdrawn or retracted into the lock mechanism **12** when the mechanism is in its "unlocked" condition as shown in FIG. **2.** Locking and unlocking of the mechanism is accomplished in the conventional manner by manual manipulation of dial **14** according to a preset combination thus eliminating the need for tools or keys which may be lost or misplaced.

A rectangular housing **24** having a pair of extended arm portions **26** is secured to lock mechanism **12** by a plurality of bolts **25.** Housing **24,** which may be of a generally square cross-section, encloses a rectangular

space in which a detonator **30** is slideably disposed. A slot **28** is formed in one wall of housing **24** of a sufficient width to accommodate the entry of cam **22**. Slot **28** permits one portion of cam **22** to enter the internal space of housing **24** while another portion of the cam protrudes through the slot into an area externally contiguous to housing **24**.

A spring **32** is seated within housing **24** and biases detonator **30** against the portion of cam **22** which enters housing **24**. Spring **32** thus forces detonator **30** to move in unison with cam **22** as the cam withdrawn or extended by the operation of the combination lock mechanism **12**.

A booster charge **34** is disposed contiguous to one side of housing **24** and communicates with the interior of the housing through an aperture **35** formed in one wall thereof. When cam **22** is extended to the position shown in FIG. **1**, aperture **35** permits direct communication between detonator **30** and booster charge **34**, so that explosion of the detonator will fire the booster charge. Booster charge **34** may be confined to an instrumentation compartment for the purpose of destroying secret electronic components, or it may be positioned to fire the main charge of the associated ordnance device.

A conventional electroresponsive primer **36** is positioned in casing **11** contiguous to the opposite side of housing **24** near the position occupied by detonator **30** when cam **22** is in its extended position. An aperture **38**, preferably aligned with aperture **35**, is formed in the wall of housing **24** abutting primer **36** to permit direct communication between primer **36** and detonator **30**.

In operation, spring **32** normally biases detonator **30** out of communication with primer **36** and booster **34** when the cam **22** is withdrawn by unlocking of mechanism **12**. Locking of mechanism **12** extends cam **22**, forcing detonator **30** into alignment with primer **36** and booster **34**. In this position an explosive train is formed from primer **36** through aperture **38** to detonator **30** and through aperture **35** to booster **34**.

As more clearly shown in FIG. **1**, an igniting wire **40** is embedded in primer **36**, and an arming contact **42** is mounted on one side of primer **36** and connected to igniting wire **40**. A unidirectional power supply **44** is mounted within casing **11** to supply igniting current to primer **36**. Power supply **44** may be a battery in the firing system of the associated ordnance device or a separate unit as shown.

A conductive leaf spring **46**, having an electrical contact **48** at one end thereof is secured at its other end to power supply **44** for carrying current to primer **36**. A cam following surface **50** is disposed on leaf spring **46** for pressingly engaging cam **22**. Leaf spring **46** is bent into a shape that causes it to bias cam following surface **50** into engagement with cam **22** even when the latter is completely withdrawn. Thus, when cam **22** is withdrawn, leaf spring **46** causes contacts **42** and **48** to separate.

As more clearly shown in FIG. **2**, primer **36** is electrically connected to an anti-recovery triggering system **52** through wire **40**. A second wire **54** completes a circuit from anti-recovery triggering system **52** to power supply **44**. The anti-recovery triggering system may be any one of a variety of electrical, mechanical or electromechanical devices which produce an electrical signal on the detection of unauthorized tampering with the associated ordnance weapon. An example of such an anti-recovery triggering system includes an annular contact **56** made of electrically conductive material mounted at the base of an exploder mechanism well **58** formed in the ordnance device **10**. A cylindrical contact **60**, also made of electrically conductive material, is slideably disposed in a small diameter bore **62** extending from the base of well **58**. A coil spring **64** is seated in bore **62** to normally bias cylindrical contact **60** into engagement with annular contact **56**.

A firing mechanism **66**, which may be an extremely sensitive magnetic influence detonator, for example, is inserted into well **58**. A small cylindrical projection **68** is formed of the nonconductive material at the base of firing mechanism **66** to maintain contacts **56** and **60** separated when firing mechanism **66** is fully seated in well **58**.

In operation, upon insertion of firing mechanism **66** into well **58**, contacts **56** and **60** are separated. Contacts **42** and **48** are also separated since lock mechanism **12** is initially in its unlocked condition and cam **22** is retracted. The anti-recovery device is armed by locking mechanism **12** in the conventional manner, thereby extending cam **22** which closes contacts **42** and **48** and aligns primer **36**, detonator **30** and booster **34**. When so armed, any undesired removal of firing mechanism **66** from well **58** will result in withdrawal of projection **68** from bore **62**, permitting contacts **56** and **60** to come into engagement. Upon engagement, contacts **56** and **60** complete a circuit path from power supply **44** to primer **36** thereby effecting detonation of the primer. Primer **36** triggers detonator **30** which in turn fires booster **34** causing complete destruction of ordnance device **10**.

However, if it is desired to remove firing mechanism **66** without destroying or exploding ordnance device **10**, as for maintenance or replacement purposes, destruction of the ordnance device is readily avoided by manipulating dial **14** according to the prescribed numerical combination to withdraw cam **22** whereupon contacts **42** and **48** are separated by the influence of spring **46** and detonator **30** is biased out of alignment with primer **36** and booster **34**.

Obviously, numerous modifications and variations of the present invention are possible in 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 herein.

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

1. A disarming mechanism for an anti-recovery device for an ordnance device comprising:

a combination lock mechanism

cam means coupled to said lock mechanism and actuated thereby from a first position to a second position;

an elongated housing secured to said lock mechanism and partially enclosing said cam means;

detonator means slideably disposed within said housing;

biasing means mounted within said housing for urging said detonator means into engagement with said cam means for motion therewith; and

explosive charge means mounted adjacent said housing, said explosive charge means being juxtaposed to said detonator means when said cam is in said

second position and separated from said detonator means when said cam is in said first position.

2. A disarming mechanism for an anti-recovery device for an ordnance device as in claim **1** further comprising:

a firing circuit for said explosive charge means having first circuit switching means thereon;

said circuit switching means being in an uninterrupted condition when said cam is in said second position thereby rendering said explosive charge means ignitable and being in an interrupted condition when said cam is in said first position thereby rendering said explosive charge means non-ignitable.

3. A disarming mechanism for an anti-recovery device for an ordnance device as in claim **2**, further comprising a normally interrupted second circuit switching means in said firing circuit for effecting ignition of said explosive charge means when said cam means is in said first position and said second circuit means is rendered continuous in response to selective tampering with said ordnance device.

4. A disarming mechanism for connection to an anti-recovery triggering system comprising:

An explosive train including a primer and a detonator, said detonator alternatively movable to an out-of-line first position or to an in-line second position;

an electric circuit connected to said primer and energizable by the actuation of said anti-recovery triggering system, said circuit including a switch;

cam means normally in an extended configuration and urgingly contacting said movable detonator for retaining said detonator in said second position and maintaining said switch in a closed mode; and

combination lock means operably coupled to said extended cam means for retracting said cam means upon proper manipulation of said lock means by an operator thereby causing said detonator to move to said first position and causing said switch to attain an open mode.

* * * * *