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Milanowski et al.

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[54] FIRING PIN ASSEMBLY

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[73] Assignee: **The United States of America as represented by the Secretary of the Army**

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[52] **U.S. Cl.**.....**102/73 A,** 102/7.6, 102/8

[51] **Int. Cl.**.....**F42c 1/06**

[58] **Field of Search**.....102/70, 73 R, 73 A, 78

[56] **References Cited**

UNITED STATES PATENTS

2,513,536	7/1950	Wellington	102/73 A
1,321,455	11/1919	Kennedy	102/73
3,021,787	2/1962	Michaels	102/73
3,379,131	4/1968	Webb	102/7.6

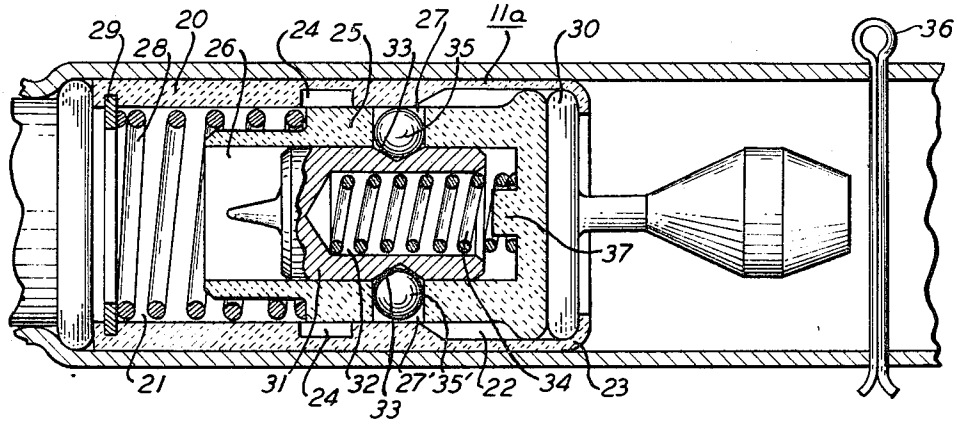
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[57] **ABSTRACT**

A firing pin assembly, adapted to provide an operable firing mechanism which will function when a practice bomb or similar device is delivered to a target from a plane at any approach angle.

2 Claims, 6 Drawing Figures



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SHEET 1 OF 2

FIG. 1

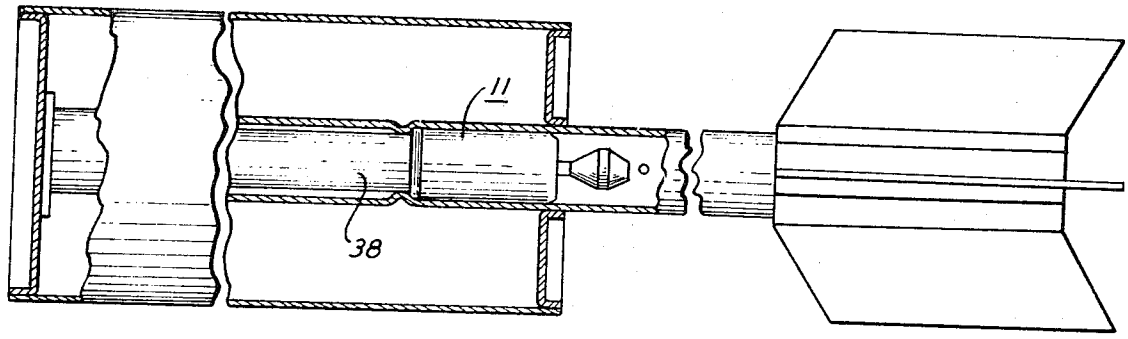


FIG. 2

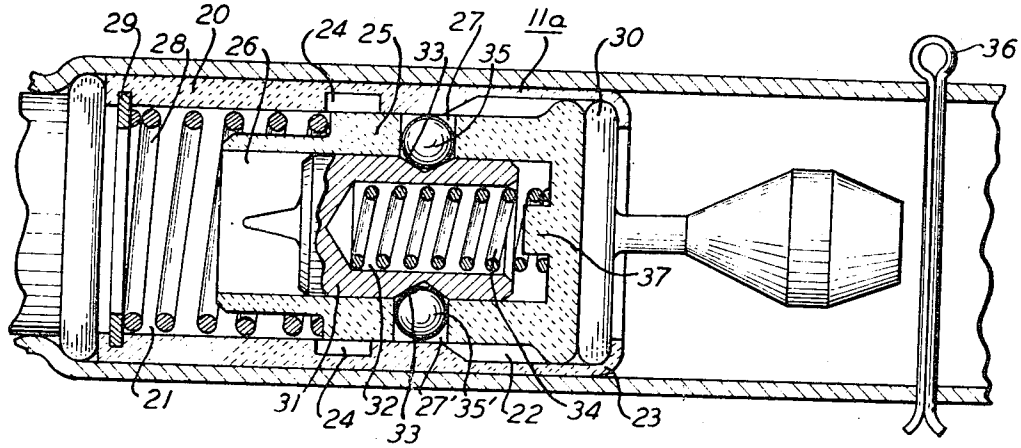
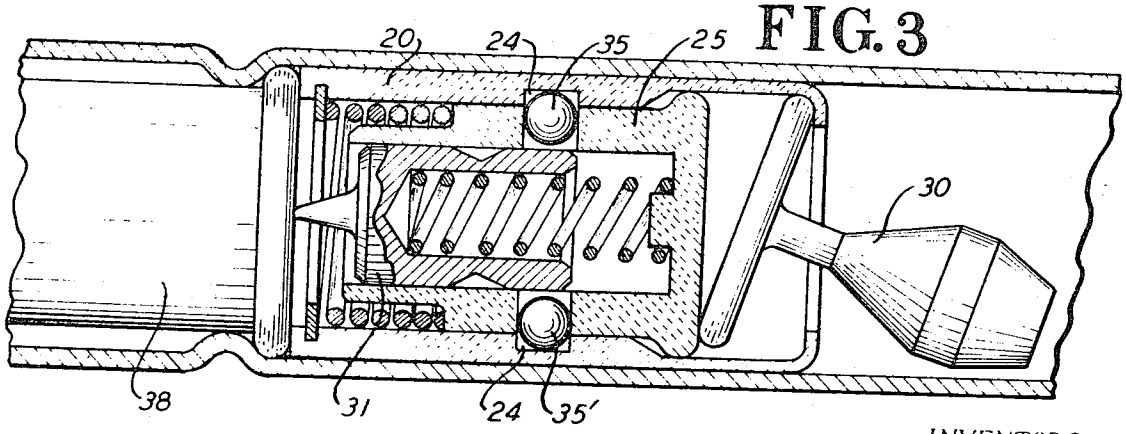


FIG. 3



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FIG. 4

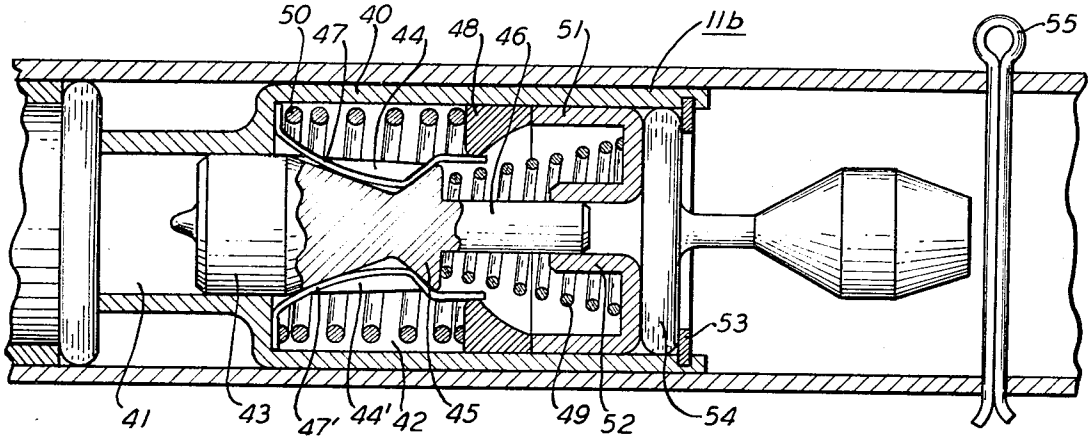


FIG. 5

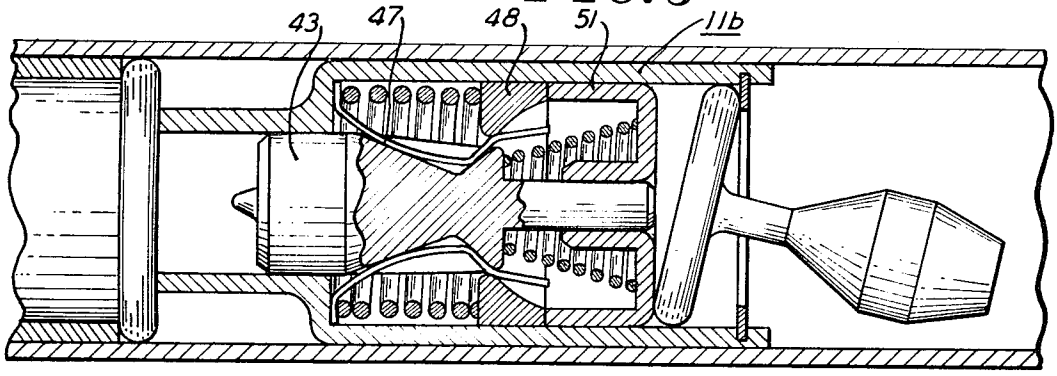
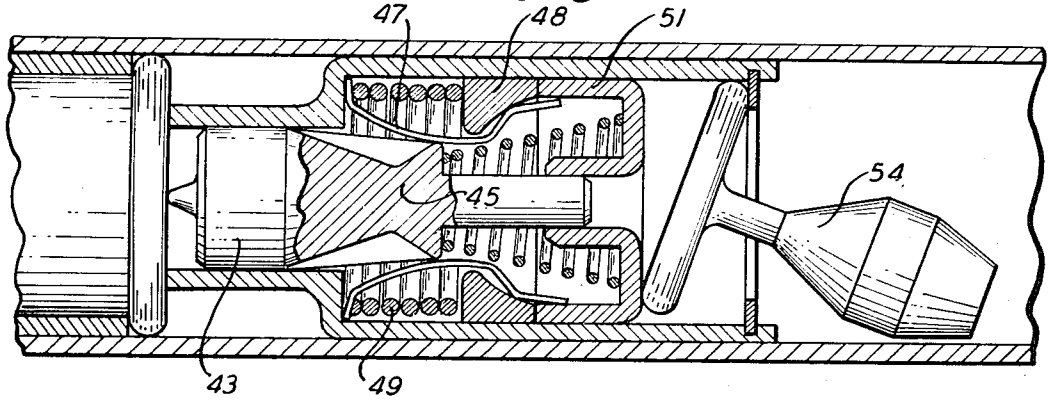


FIG. 6



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FIRING PIN ASSEMBLY

The invention described herein may be manufactured, used and licensed by or for the Government for Governmental purposes without payment to us of any royalties thereon.

BACKGROUND OF INVENTION

This invention relates generally to firing mechanism, and more specifically relates to a firing pin assembly which provides a unitary construction in which the firing pin assembly is mounted for firing a practice bomb or other similar device on impact of the bomb from any approach angle.

Pursuant to the invention, the firing pin assembly will operate conveniently and efficiently in practice target drops onto any type of terrain and in water, from any approach angle.

In accordance with the foregoing it may be regarded as among the objects of the present invention to provide a novel firing pin assembly for use in detonation of a practice bomb on impact with a target, to achieve a high level of efficiency in training.

Now in accordance with the present invention, the foregoing objects and others as will become apparent in the course of the ensuing specification are achieved through use of a firing pin assembly operable as will be described below so that the practice bomb can be delivered at any target approach angle to a land or water target.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is diagrammatically illustrated by way of example in the appended drawings wherein similar reference characters indicate like parts, in which:

FIG. **1** is a side elevational, fragmentary partly-sectional view of a practice bomb with the firing pin assembly of the invention positioned therein;

FIG. **2** is a side elevational fragmentary partly-sectional view of a first embodiment of the firing pin assembly pursuant to the invention, shown in a safe condition;

FIG. **3** is a similar view thereof, shown in a fired condition;

FIG. **4** is a side elevational, fragmentary partly-sectional view of a second embodiment of the firing pin assembly pursuant to the invention, shown in a safe condition;

FIG. **5** is a similar view thereof, shown in an armed condition; and

FIG. **6** is a similar view thereof, shown in a fired condition.

DESCRIPTION OF PREFERRED EMBODIMENTS

In accordance with the preferred mode of practicing the invention, the firing pin assembly **11** (FIG. **1**) is shown in position in a practice bomb **12**.

In a first embodiment of the invention (FIGS. **2** and **3**) the firing pin assembly **11***a* comprises, for example, an outer housing **20** with a forward cavity portion **21**, rear cavity portion **22**, end portion **23** and recessed opening **24** therein an inner housing **25**, with cavity **26**, firing pin spring guide **37**, and apertures **27**, **27'** therein, an inner housing spring **28**, spring retainer ring **29**, and actuator member **30** between said outer housing **20** and inner housing **25**, a firing pin **31** with rear

cavity **32**, outer wall channel **33**, and firing pin spring **34** between said firing pin rear cavity **32** and said inner housing **25**, bearing members **35**, **35'**, and pin retainer **36**.

In a second embodiment of the invention (FIGS. **4–6**) the firing pin assembly **11b**, for example, comprises outer housing **40** with forward cavity portion **41** and rear cavity portion **42**, a firing pin **43**, with slots **44**, **44'** shown (**44''** not shown, three slots in this embodiment), rear rim portion **45** and rear shaft portion **46**, flat springs **47**, **47'** shown (**47''** not shown, three springs in this embodiment) sliding sleeve **48**, firing pin spring **49**, spacer spring **50**, an inner housing **51** with forward projecting sleeve **52**, retainer ring **53**, actuator **54** and pin retainer **55**.

In operation of a first embodiment of the invention (FIGS. **2** and **3**), for example, the firing pin assembly **11a** comprised a suspended internal mechanism. To prepare the firing pin assembly **11***a* in a safe position (FIG. **2**), the operator will place the firing pin spring **34** into the rear cavity **32** of the firing pin **31**. The firing pin subassembly is then placed in cavity **26** of inner housing **25** until firing pin spring **34** is aligned on firing pin spring guide **37**. The bearing members **35** and **35'** are then placed in the apertures **27** and **27'**. This inner housing subassembly is then inserted into the forward cavity portion **21** of the outer housing **20** through the rear cavity portion **22**. The firing pin **31** is then depressed in cavity **26** of the inner housing **25** until the outer wall channel **33** aligns with apertures **27** and **27'**. This will be evidenced by the permission of further movement of the inner housing subassembly into the forward cavity **21** thereby allowing bearing members **35** and **35'** to contact forward cavity wall **21** between recess opening **24** and rear cavity portion **22**. With the inner housing subassembly held in position, the actuator member **30** may then be placed behind the inner housing subassembly and the end portion **23** of the outer housing **20** is rolled over the actuator member **30** thereby securing the inner housing subassembly and the actuator to the outer housing. The inner housing spring **28** may then be placed into the forward cavity portion **21** of the outer housing **20** and locked therein by retainer ring **29**. In operation, (FIG. **3**) when the assembled practice bomb is dropped in a horizontal position with no forward movement the rear portion of the actuator member **30** will move to the fired position shown because of the gravitational force at impact. This movement of the actuator member **30** will force the inner housing sub-assembly to move forward to a position where the bearing members **35**, **35'** will move into the recessed opening **24** of the outer housing **20** to thereby release the firing pin **31** so that it can move forward and strike the shot gun shell **38**. When the practice bomb is dropped from a fast moving plane at very low altitudes and strikes the ground or water, the inner housing **25** will move forward by itself due to the full force of the impact allowing the bearing members **35**, **35'** to move into the recessed opening **24** of the outer housing **20** to release the firing pin to strike the shot gun shell.

In operation of a second embodiment of the invention, (FIGS. **4–6**), for example, the firing pin assembly **11***b* comprises a flat spring action mechanism. To prepare the firing pin assembly **11***b* in a safe condition

(FIG. 4) ready for firing, the operator will place the firing pin 43 into the forward cavity portion 41 of outer housing 40. The flat springs 47 (three in the embodiment shown) may then be assembled in the slots 44 (three in the embodiment shown) of the firing pin 43. The spacer spring 50 is then placed into cavity 42 over the flat springs 47. The flat spring 47 and the sliding sleeve 48 are then placed in the position shown in FIG. 4. The helical firing pin spring 49 is then assembled on the rear shaft portion 46 of the firing pin 43, and then the inner housing 51 and actuator 54 are placed in the position shown in FIG. 4. The complete assembly is then retained by retainer ring 53. In operation (FIGS. 4–6) when the assembled practice bomb is dropped in a horizontal position with no forward movement, the rear portion of the actuator member 54 will move to the firing position shown (FIG. 6) because of the gravitational force at impact. This movement of the actuator member 54 will force the inner housing 51 together with the sliding sleeve 48 to a position where the inner radius of the sliding sleeve 48 will slip off the rear flat surfaces of the flat springs 47 and allow the angular surfaces of the flat springs to ride over the adjacent angular surfaces of the rear rim portion 45 of the firing pin 43 thus releasing the firing pin 43 so that the conical firing pin spring 49 will force the firing pin forward to strike the shot gun shell. When the practice bomb is dropped from a fast moving plane at very low altitudes and strikes the ground or water, the force of impact will move the inner housing 51 and the sliding sleeve 48 forward far enough to release the flat springs 47 that hold the firing pin 43 so that is can move forward to strike the shot gun shell.

The advantage of this invention is that it will operate in practice target drops onto any type of terrain and in water from any approach angle because of the versatility of the internal mechanism.

While the present invention has been particularly set forth in terms of specific embodiments thereof, it will be evident in view of the instant disclosure, that numerous variations upon the invention are now enabled to those skilled in the art, which variations in propriety are yet within the true scope of this teaching. Accordingly the invention is to be broadly construed, and limited only by the scope and spirit of the claims now appended hereto.

I claim:

1. A firing pin assembly, for firing a practice bomb or similar device upon delivery thereof to a target, comprising:

a. a biased firing pin member which includes;

an outer wall portion, a projecting forward tip portion and a rear-opening cavity portion and an outer wall circumferential channel positioned at an intermediate point along said outer wall portion;

b. displacement means, for displacing said firing pin member upon impact which includes;

an inner housing member, having an outer wall portion with a constricted forward sleeve portion and a forward bearing surface and a rear enlarged guide portion with a rear bearing surface, a front-opening cavity portion with an inner bearing surface, and apertures spaced circumferentially at an intermediate location in said inner housing member, a hollow retainer ring retained in a forward portion of said outer housing member, an inner housing spring interposed between said inner housing forward bearing surface and said retainer ring, an actuator member having a front plate portion, an intermediate neck portion, and an enlarged rear portion interposed between said inner housing rear bearing surface and said outer housing rear inner wall portion and extending through said rear portion of said outer housing member, a firing pin spring interposed between said firing pin cavity portion and said inner housing inner bearing surface, and bearing members disposed in said circumferentially spaced inner housing apertures interposed between said outer housing inner wall recessed circumferential channel and said firing pin outer wall circumferential channel;

c. a frame member, housing said firing pin member and displacement means therein which includes;

a hollow tubular outer housing member, comprising an outer wall portion, an inner front wall portion and a reduced inner rear wall guide portion and an inner wall recessed circumferential channel positioned at an intermediate point along said inner front wall portion.

2. A firing pin assembly, for firing a practice bomb or similar device upon delivery thereof to a target which comprises:

a cylindrical outer housing having a forward cavity in a first end and a rear cavity of larger diameter communicating with said forward cavity in its other end, said rear cavity having a retainer ring operatively positioned in said other end, said housing having a shoulder intermediate said forward and rear cavities.

a firing pin having a pointed end slidably fitting within said forward cavity, a rear rim portion, a rear shaft integral with said rear rim and axially aligned with said pointed end, a plurality of spring slots intermediate said pointed end and said rear rim;

an inner cylindrical housing slidably fitting within said rear cavity having an open end and a closed end and a forward sleeve projecting from said closed end slidably positioned upon said rear shaft;

a conically-shaped spring operatively positioned intermediate said firing pin rear rim and said inner housing so that said conically-shaped spring is circumambient said rear shaft and said forward projecting sleeve;

a cylindrical sliding sleeve slidably positioned in said rear cavity having a first end adjacent said inner housing open end and a constricted rim on the other end;

a helical spacer spring biasedly positioned within said outer housing rear cavity circumambient said firing pin spring slots having a first end adjacent said sliding sleeve constricted end and its other end directed toward said outer housing shoulder;

a plurality of flat springs each interposed in one of said firing pin slots at one end bearing against said outer housing shoulder and at an intermediate point on flat surfaces contacting said firing pin spring slots, and at said flat springs other ends tan-

gentially contacting said sliding sleeve forward constricted other end; and

an actuator member having a front plate intermediate said inner housing and said retainer ring portion, said plate having a rounded edge, an intermediate neck portion passing through said retainer ring and an enlarged rear portion which upon impact forces said inner housing together with said sliding sleeve to a position where said rear rim slips off said flat springs other ends thereby permitting said flat springs to move outwardly and away from said firing pin thereby releasing said firing pin and initiating said bomb.

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