

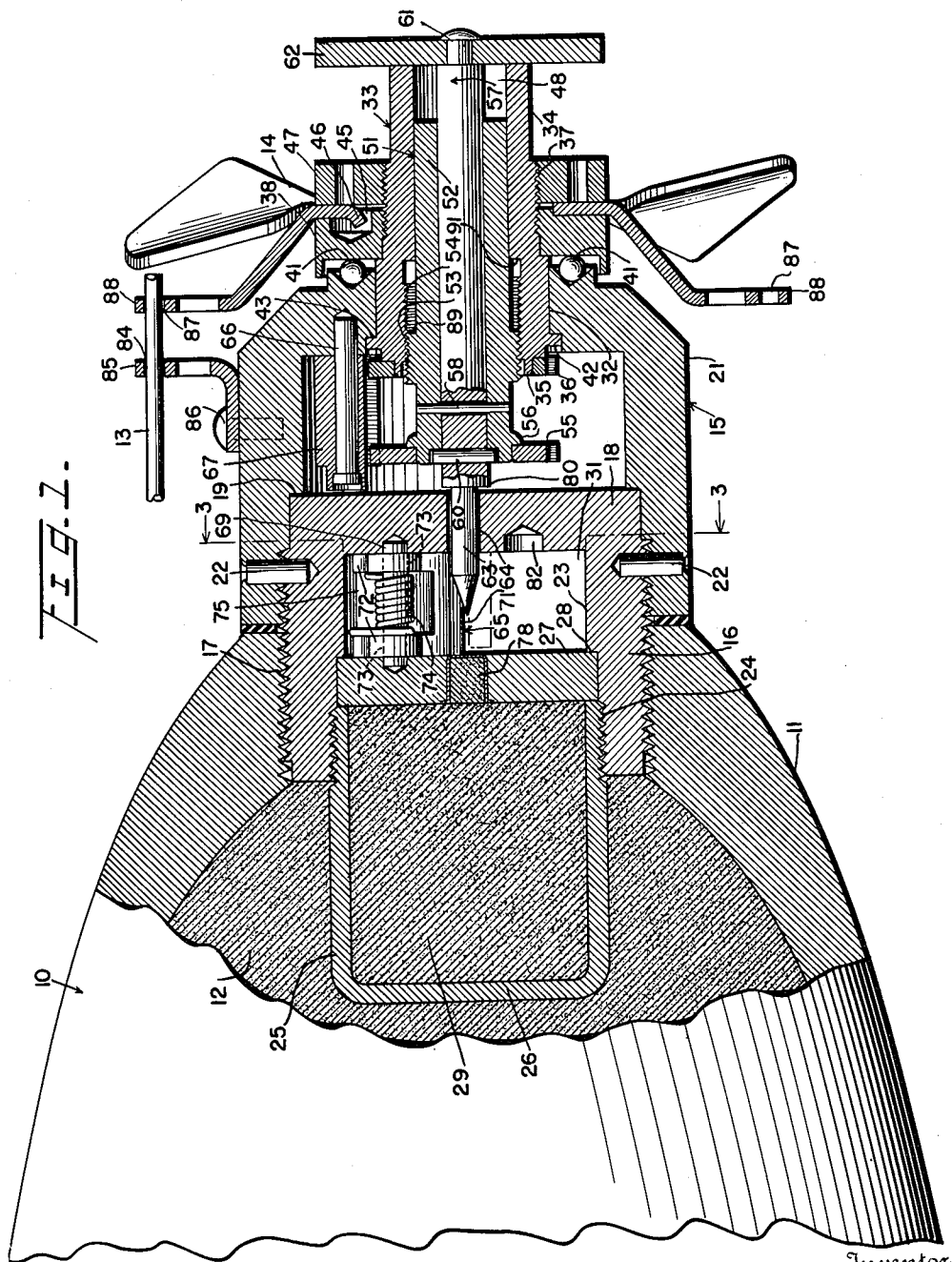
April 24, 1956

C. F. BOWERSETT
NOSE FUZE FOR A BOMB

2,742,859

Filed Dec. 20, 1946

4 Sheets-Sheet 1



Inventor
C. F. BOWERSETT

334

M. C. Hayes
Attorney

April 24, 1956

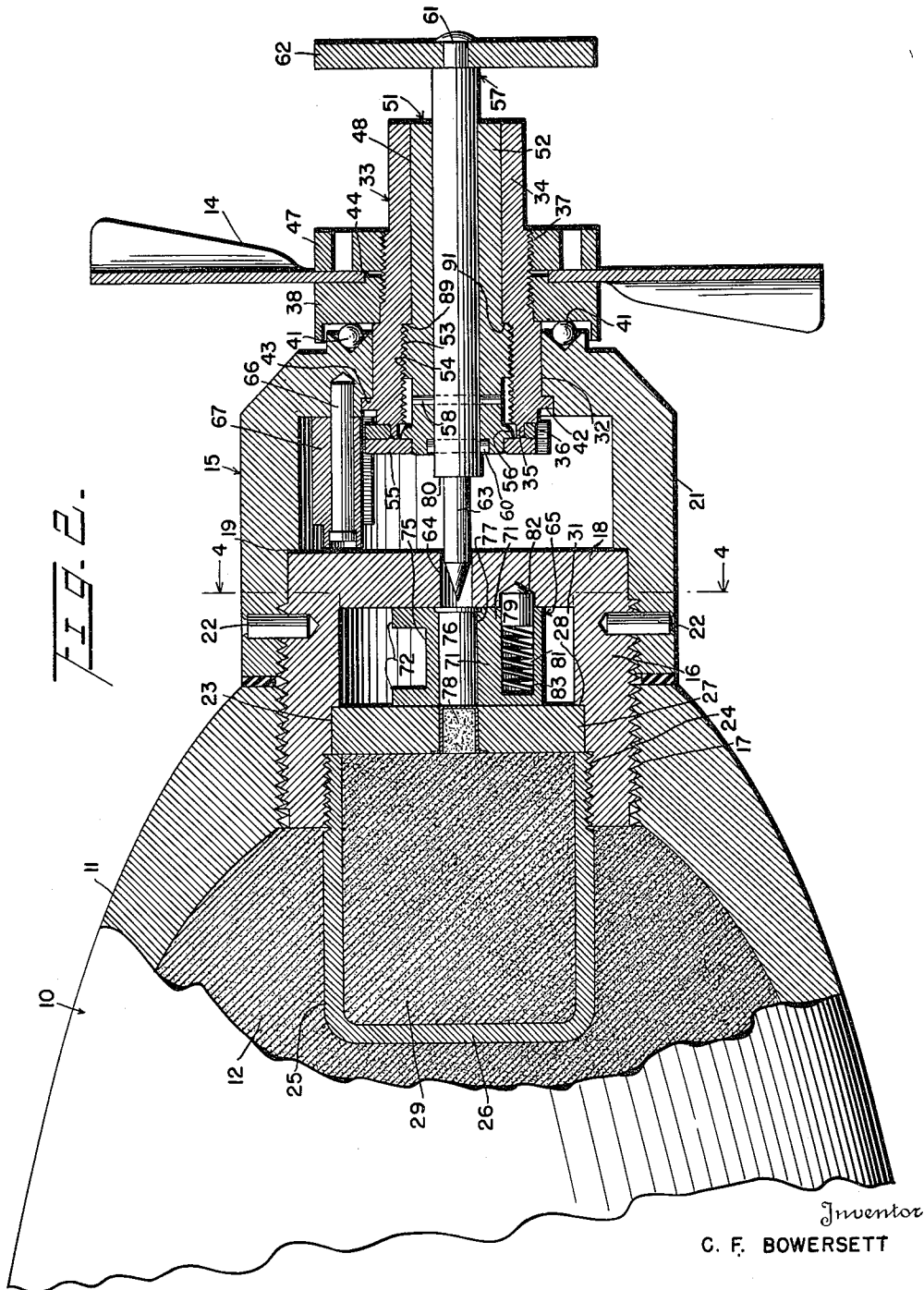
C. F. BOWERSETT

2,742,859

NOSE FUZE FOR A BOMB

Filed Dec. 20, 1946

4 Sheets-Sheet 2



By

M. Hayes

Attorney

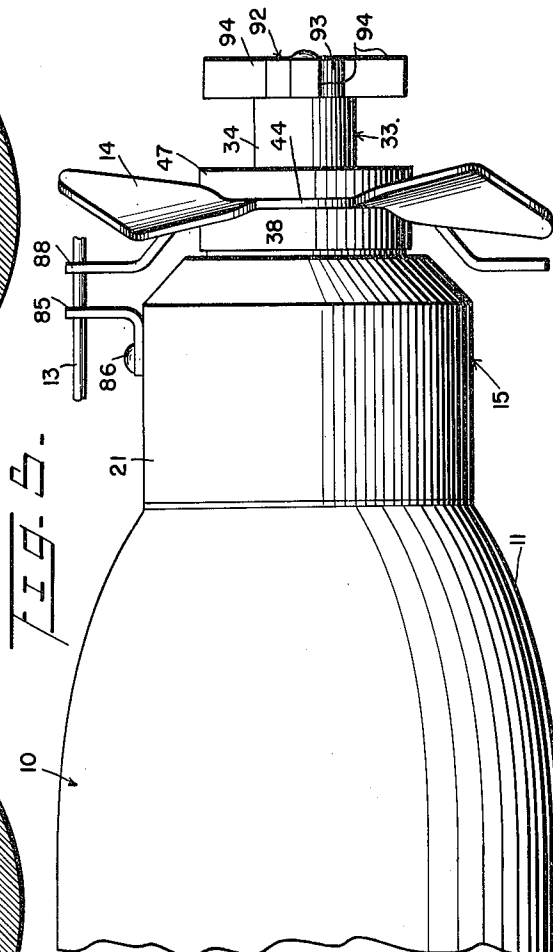
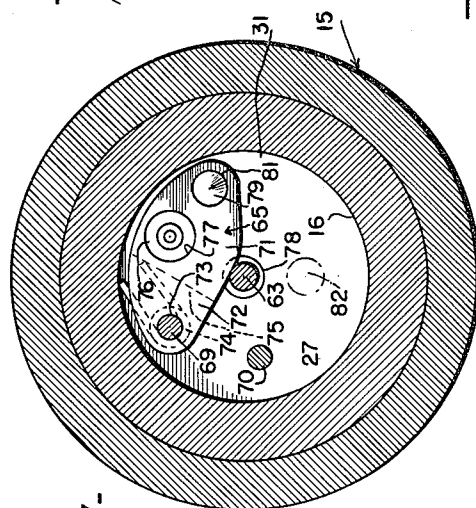
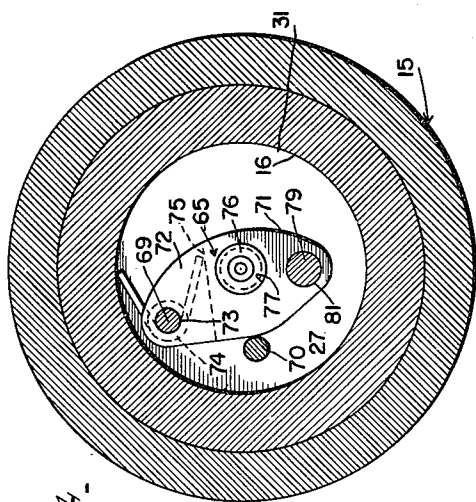
April 24, 1956

C. F. BOWERSETT
NOSE FUZE FOR A BOMB

2,742,859

Filed Dec. 20, 1946

4 Sheets-Sheet 3



Inventor
C. F. BOWERSETT

McNayes
Attorney

April 24, 1956

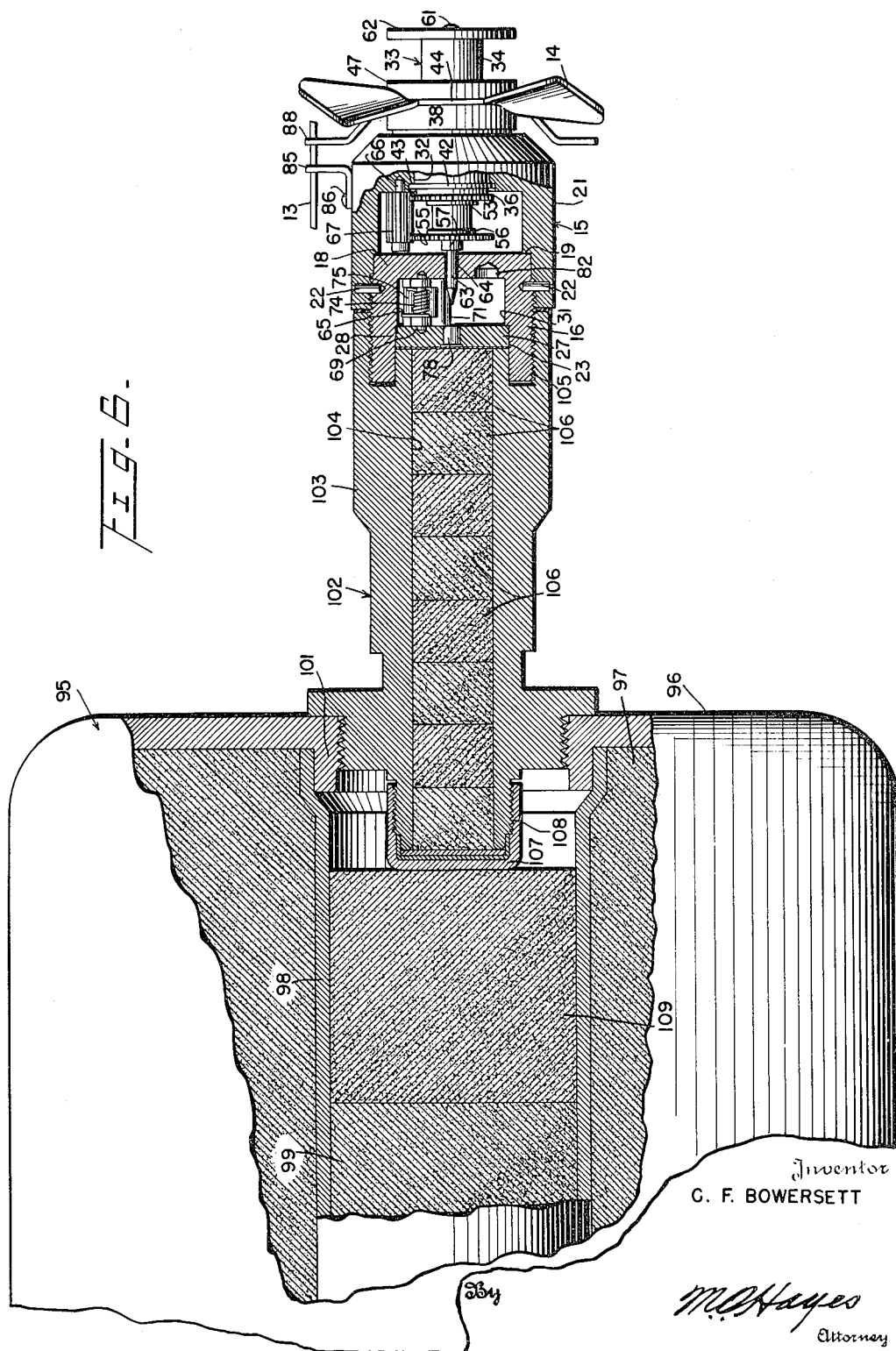
C. F. BOWERSETT

2,742,859

NOSE FUZE FOR A BOMB

Filed Dec. 20, 1946

4 Sheets-Sheet 4



1

2,742,859

NOSE FUZE FOR A BOMB

Charles F. Bowersett, Arlington, Va.

Application December 20, 1946, Serial No. 717,364

4 Claims. (Cl. 102—81.2)

(Granted under Title 35, U. S. Code (1952), sec. 266)

This invention relates to a fuze and more particularly to a mechanically operated impact fuze for use on the nose of a bomb, rocket or the like.

The present invention relates to a new and improved impact nose fuze for a bomb or the like adapted to fire instantaneously upon impact of the bomb with the surface of a body of water, sand or terra firma, as the case may be, and in which means may be also provided such that, if desired, explosion of the main charge within the bomb may occur in predetermined time delayed relation with respect to impact of the bomb with the aforesaid elements. Furthermore, according to one form of the invention, the present invention provides an impact nose fuze for a bomb in which new and improved means are provided such that the fuze will not function upon impact of the bomb with the surface of a body of water but will pass therethrough a predetermined depth such, for example, as twenty feet and fire upon impact of the bomb with the bed of the body of water thereby to fire the main explosive charge arranged within the bomb.

The present invention provides a fuze for a bomb having new and improved safety features incorporated therein such that premature firing of the bomb is prevented should the bomb be accidentally dropped from a distance of 20 feet during handling and transportation. In fuzes of this general type heretofore devised, should a bomb having a fuze of the prior art type be accidentally dropped by the crew members a distance of approximately 20 feet as the bomb is being releasably attached to an aircraft by the crew member, or during transportation thereof prior to attaching the bomb to an aircraft, premature explosion of the bomb would occur provided that the nose thereof struck a hard surface or object with sufficient force to crush the nose of the bomb inasmuch as the detonator and firing pin are aligned at all times, such crushing action of the nose of the bomb driving the firing pin into firing engagement with the detonator and exploding the bomb.

The principal object of the present invention, therefore, is to provide an impact nose fuze for a bomb having new and improved means for preventing premature firing thereof due to a sudden shock.

Another object is to provide an impact nose fuze in which the detonator is maintained in a safe locked position and out of alignment with the firing pin until the bomb is released from an aircraft in flight and arming thereof will occur only when the bomb has traveled a predetermined distance from the aircraft during the free flight of the bomb toward a target.

Another object of the present invention is to provide a new and improved mechanically operated nose fuze for a bomb in which premature firing thereof is prevented should the bomb be accidentally dropped a distance of approximately 20 feet.

Another object is to provide a normally unarmed impact nose fuze for a bomb having new and improved arming means arranged therein adapted to be maintained in an initial safe position until the bomb is dropped from

2

an aircraft in flight and in which arming thereof does not occur except during the free flight of the bomb toward the target.

A further object is to provide an impact nose fuze for a bomb having new and improved firing means arranged therein adapted to function on the surface of a body of water, soft sand, or terra firma, and in which firing thereof will occur in predetermined time delayed relation with respect to impact of the bomb with a target or with the bed of a body of water.

A still further object is to provide a new and improved impact nose fuze for a bomb which is economical to manufacture, reliable in operation and which possesses all the qualities of ruggedness and dependability in service.

Still other objects, advantages and improvements will be apparent from the following description, taken in connection with the accompanying drawings, of which:

Fig. 1 is a central longitudinal sectional view of the fuze and a portion of the bomb to which the fuze is secured, the fuze being shown in an unarmed condition;

Fig. 2 is a view similar to Fig. 1 but showing the fuze in an armed condition;

Fig. 3 is an enlarged sectional view taken on line 3—3 of Fig. 1;

Fig. 4 is a view taken on line 4—4 of Fig. 2 and showing the fuze in an armed condition;

Fig. 5 is a detail view of the fuze showing an alternative form of striker head secured thereto; and

Fig. 6 is a view partly in section and partly in elevation and showing the fuze connected to a rocket.

Referring now to the drawings for a more complete understanding of the invention wherein like reference characters indicate like parts throughout the several views, a fragmentary portion of a bomb is indicated generally by the numeral 10 and comprising a casing 11 having arranged therein the usual explosive charge 12 as is well known to those skilled in the art to which the invention pertains.

The bomb may be releasably supported to an aircraft in flight in the usual manner, and an arming wire 13 connected to the aircraft is preferably employed to prevent rotative movement of the propeller 14 secured to the fuze of the present invention and generally indicated by the reference character 15.

The fuze is supported on the nose of the bomb in any suitable manner but preferably by a cup-shaped member 16 having threaded engagement with a centrally disposed bore 17 provided in the nose of the bomb, Figs. 1 and 2. The cup-shaped member 16 has integrally formed thereon an end wall 18, having abutting relation with respect to a shoulder 19 formed on a fuze head or casing 21, the casing being threaded to the cup-shaped member 16 and locked thereto by a pair of pins 22 thereby to prevent rotation of the casing 21 with respect to the cup-shaped member as the fuze is threaded into the bore 17 in the nose of the bomb.

The cup-shaped member 16 is provided with a well 23 a portion of which is threaded as at 24, and having threaded engagement with a booster cup or container 25. One end of the container 25 is closed by an end wall 26 integrally formed therewith, the other end thereof being closed by a relatively thick metallic disc 27 disposed between a shoulder 28 formed on the cup-shaped member 16 and the outer end of the booster cup 25, Figs. 1 and 2. Arranged within the booster cup and disposed between the wall 26 and the disc 27 is a booster charge 29. As shown on Figs. 1 and 2 the booster cup extends a predetermined distance into the explosive charge 12, thereby to provide means for firing the explosive charge upon impact of the bomb with the target. A chamber 31 is provided in the cup-shaped member 16 between the end

wall 18 and the disc 27, the purpose of which will be more clearly apparent as the description proceeds.

Rotatably supported within a bore 32 axially arranged within the head 21 is an arming hub generally indicated by the reference character 33. The arming hub comprises a tubular body 34 having a reduced portion 35 formed thereon for supporting a stationary gear 36, the gear being secured to the portion 35 of the hub 33 in any suitable manner but preferably staked thereto. The tubular body 34 of the arming hub 33 is threaded as at 37, having threaded engagement with a thrust bearing 38, the thrust bearing including a plurality of ball bearings 41 disposed within a pair of complementary races arranged in the thrust bearing 38 and in the outer end of the head 21, respectively. It will be understood, however, that the thrust bearing 38 is adapted to relieve the axial thrust from the propeller 14 during the free flight of the bomb toward the target.

As shown on Figs. 1 and 2 the arming hub 33 has integrally formed thereon a flange 42 having abutting engagement with a shoulder 43 formed in the head 21, the flange being maintained in abutting engagement with the shoulder 43 by the aforesaid thrust bearing, thereby to prevent endwise movement of the arming hub within the head 21. It will be understood, however, that the arming hub 33 is free to rotate within the bore 32 provided in the head 21 during the free flight of the bomb toward the target.

The propeller 14 comprises a hub 44 secured to the thrust bearing 38 in any convenient manner but preferably as shown on Figs. 1 and 2. The securing means for the propeller includes a well 45 arranged in the thrust bearing 38 and a lug 46 formed on the hub 44 of the propeller, the lug being adapted to extend a predetermined distance into the well thereby to lock the propeller 14 to the thrust bearing 38 in such a manner as to impart rotative movement to the thrust bearing during the free flight of the bomb toward the target.

The propeller 14 is maintained in locking engagement with the thrust bearing by a retainer nut 47 threaded onto the arming hub 33 and into abutting engagement with the thrust bearing Figs. 1 and 2. From the foregoing description it will be apparent that the arming hub 33, thrust bearing 38, retainer nut 47, and gear 36 will rotate as a unit in response to the pressure of air against the propeller blades during the free flight of the bomb toward the target.

Rotatably and slideably supported within an axial bore 48 arranged in the arming hub 33 is an arming sleeve 51. The arming sleeve comprises a body 52 having an enlarged threaded portion 53 formed thereon adapted to have threaded engagement with the bore 48 as at 54. Arranged on one end of the arming sleeve is a gear 55, the gear being staked to the arming sleeve in a well known manner and rotatable therewith, the gear 55 having abutting engagement with a flange 56 formed on the arming sleeve thereby to maintain the gear fixed to the end of the arming sleeve.

A firing pin generally indicated by the reference character 57 is releasably secured to the arming sleeve 51 by a shear pin 58 Figs. 1 and 2, the shear pin extending through complementary bores provided in the arming sleeve 51 and the firing pin 57. Rotative movement of the sleeve 52 is imparted to the firing pin 57 by a non-shearable pin 60 secured thereto and detachably disposed within a recess provided in the inner surface of the sleeve, and thus the shear pin 58 is relieved of any torsional stress thereon as the sleeve 52 is rotated and also providing axial movement of the firing pin inwardly with respect to the sleeve in response to a sudden impact received thereby. Secured to one end of the firing pin 57 as at 61 is an impact disc 62, the other end thereof being reduced in size to form striker 63 adapted to extend through a bore 64 provided in the end wall 18 of the cup-shaped member 16 and to engage a detonator holder or shutter generally indicated by the reference character 65. The detonator

holder thus is maintained in a safe position by the striker until the striker is withdrawn from bore 64 after the bomb has been released from the aircraft and has traveled a predetermined distance therefrom.

Rotatably supported on a stud 66 and in continuous mesh with the gears 36 and 55 is an idle or driving gear 67, the movable gear 55 having one tooth more than the stationary gear 36. By this arrangement there is relative rotative motion between the gears 36 and 55, such rotation being transferred to the arming sleeve 51 through the gear 55. When this occurs, the arming sleeve 51 is moved outwardly due to the threaded engagement of the arming sleeve with the bore 48. From the foregoing description, it will be apparent that a structure has been disclosed in which the arming sleeve 51 is adapted to rotate at a greatly reduced rate of speed with respect to the rotation of the arming hub and component parts thereof by reason of the planetary gear arrangement disclosed.

The detonator holder or shutter 65 is pivotally mounted within the chamber 31 by a pin 69. The holder comprises a body 71 having integrally formed thereon a pair of spaced ears 72, each ear being provided with an aperture 73 through which the pivot pin 69 extends. The pin is secured to the end wall 18 of the cup-shaped member 16 in any suitable manner such, for example, as a press fit. As shown on Figs. 3 and 4, a torsion spring 74 surrounds the pivot pin 69, the convolutions thereof being disposed between the ears 72, one leg of the spring being in engagement with the inner wall surface of the cup-shaped member 16, and the other leg being in engagement with a wall 75 formed on the shutter 65 such that when the firing pin is withdrawn from engagement with the shutter during the free flight of the bomb toward the target the shutter is moved to an armed position, Figs. 3 and 4, by the spring 74.

A detonator 76 is arranged within an aperture 77 provided in the shutter 65 and adapted to be moved into alignment with a lead-in charge 78 arranged in the disc 27 when the shutter has been moved in an armed position in engagement with a stop pin 70. It will be obvious that when this occurs the detonator is also brought in alignment with the now retracted firing pin Fig. 4 and the fuze is armed.

As shown on Fig. 1 the striker 63 is maintained in spaced relation with respect to the lead-in charge 78 invariably by the impact disc 62 secured on one end of the firing pin and having abutting engagement with the end portion of the arming hub 33. It will be understood, however, should the bomb be accidentally dropped during handling and the impact disc 62 strikes a hard surface, premature firing of the bomb is prevented as the detonator is in the safe position and out of alignment with the firing pin when this occurs. The striker 63 is additionally prevented from being driven into engagement with the lead-in charge 78 when the bomb is accidentally dropped and the nose thereof strikes a hard surface by a shoulder 80 formed on the firing pin and adapted to engage the end wall 18 of the cup-shaped member 16 thus preventing premature damage to the lead-in charge by the striker 63.

The shutter 65 is also provided with a locking detent 79 arranged in a bore 81 formed therein and adapted to engage a well 82 disposed in the end wall 18 of the cup-shaped member 16 when the shutter has been moved to an armed position. The detent 79 is urged into the well 82 by a spring 83 arranged in the bore 81 and having one end thereof in engagement with one end of the detent, the other end of the spring being seated against the bottom wall of the well 82 thereby to lock the shutter in an armed position Figs. 2 and 4 when the shutter has been rotated a predetermined amount by the torsion spring 74, which occurs after the firing pin has been withdrawn from engagement with the shutter and during the free flight of the bomb toward the target.

It will be understood, however, that the shutter 65

5

is maintained in an initial safe position by the firing pin 57 and rotation thereof to an armed position is prevented by the firing pin until the bomb is released from an aircraft in flight and the propeller 14 has made a predetermined number of revolutions such, for example, as 400 revolutions.

As shown on Fig. 1 the propeller 14 is restrained from rotation during transportation of the bomb on the aircraft by the aforesaid arming wire 13 which is normally arranged in an aperture 84 provided in a guide 85 secured to the head 21 of the fuze in any suitable manner but preferably by one or more screws 86, the arming wire also extending through one of a pair of complementary apertures 87 respectively arranged in a pair of diametrically disposed arms 88 formed on the propeller hub 44.

As shown on Figs. 2 and 4 of the drawings, the fuse is in an armed position, the arming sleeve 51 and firing pin 57 having been moved outwardly a predetermined amount through the medium of the propeller and planetary gear arrangement heretofore described, thus releasing the shutter 65 which is rotated to an armed position by the torsion spring 74. When this occurs, the firing pin 57, detonator 76 and lead-in charge 78 are in alignment and, upon impact of the bomb with the target, the impact disc 62 is driven inwardly in response to the force of impact received thereby and concurrently therewith the shear pin 58 is severed, whereupon the striker 63 on the firing pin 57 is driven into the detonator with sufficient force to fire the detonator, the detonator being adapted to ignite the lead-in charge 78 thereby to ignite the booster charge 29 which fires the main charge 12 and explodes the bomb. It will be understood, however, that during the arming of the fuze the propeller 14 makes a predetermined number of revolutions during the free flight of the bomb toward the target during which time the arming sleeve 51 is also adapted to rotate a predetermined lesser number of revolutions and the arming sleeve will move outwardly due to the threaded engagement thereof with the threaded portion 54 of the bore 48 until the gear 55 on the arming sleeve engages the gear 36 on the arming hub 33 and, concurrently therewith, a shoulder 89 on the arming sleeve 51 engages a complementary shoulder 91 formed in the bore 48 of the arming hub 33. When this occurs the arming hub 33 and arming sleeve 51 are locked together and further rotation of the aforesaid hub and sleeve by the propeller is prevented.

On Fig. 5 an alternative form of impact member 92 adapted for use with the present invention is shown, the impact member 92 comprising a hub 93 having a plurality of radial arms 94 extending therefrom. The impact member is secured to the firing pin 57 in the same manner as the impact disc 62. It will be understood, however, that when the bomb strikes the surface of a body of water the impact force applied to the shear pin 58 through the impact member 92 is insufficient to cause the shear pin to break due to the size of the impact member and the strength of the shear pin and thus the fuze will not function at this time but as the bomb strikes the bed of a body of water sufficient force is applied to the shear pin through the impact member 92 such that the shear pin will break or shear whereby the fuze will function to explode the bomb.

It will be further understood, however, that the shear pin 58 may be so constructed as to shear or break in response to a predetermined amount of force applied thereto, such shearing or breaking action resulting from the impact force applied to the shear pin as the bomb strikes an object such, for example, as the surface of a body of water, soft sand or the like, the fuze also being adapted to fire in predetermined time delay relation with respect to impact of the bomb with a target, if desired, by employing a time delay element in the detonator. The shear pin 58 may be composed of any material suitable for the purpose which has the characteristic of

6

shearing in response to sudden force applied thereto, it being understood, however, that the strength of the pin may be varied such that the fuze will function selectively on the surface of a body of water, soft sand, and the like or upon the bed of a body of water, as the case may be.

Let it be assumed, for the purpose of description, that a bomb employing a fuze of the present invention is released from an aircraft in flight toward a target. As the bomb falls away from the aircraft the arming wire 13 is withdrawn from the arm 88 and guide 85 thereby releasing the propeller for rotation. When the propeller has made a predetermined number of revolutions during the free flight of the bomb through the air, the fuze is armed, Figs. 2 and 4. During the arming of the fuze, the arming hub 33 is rotated by the propeller and thus the planetary gear arrangement is set in motion and rotative movement is imparted to the arming sleeve 51 whereupon the arming sleeve during rotation thereof is threaded into the threaded portion 54 of the bore 48 in such a manner as to withdraw the striker 63 on the firing pin 57 from locking engagement with the shutter 65. When this occurs the shutter is moved to an armed position by the torsion spring 69 and the fuze is armed, Figs. 2 and 4, with the firing pin 57 extended and the detonator moved into alignment with the firing pin and lead-in charge 78. Upon impact of the bomb with the target the firing pin is driven into the detonator with sufficient force to fire the detonator, the detonator ignites the lead-in charge which in turn ignites the booster charge, the blast from the booster being adapted to ignite the main charge and explode the bomb.

On Fig. 6 the fuze of the present invention is shown in connection with a portion of a rocket of a well known type and generally indicated by the reference character 95 which includes the usual rocket head 96 having arranged therein the main explosive charge 97, the fuze seat liner or container 98, and the usual booster charge 99 arranged within the liner 98. As the rocket described above is the conventional type of rocket, further detailed description thereof is deemed unnecessary.

Secured to the rocket head 98 as by threaded engagement with an internally threaded nipple 101 formed on the head thereof is an elongated adapter 102, the adapter comprising a cylindrical body 103 having a centrally disposed bore 104 extending therethrough. The bore 104 is enlarged and threaded as at 105, having threaded engagement with the cup-shaped member 16 of the fuze whereby the propeller 14 and impact disc 62 are supported by the adapter 102 at a distance from the outer end of the rocket head 98 thereby to insure that the propeller will be within the wind stream and to increase the angle of impact of the rocket with the target at which firing will occur.

Arranged within the bore 104 is a plurality of tetryl pellets 106, one end pellet being in abutting engagement with the disc 27 and the other end pellet being in substantial abutting engagement with a closure cap 107, having threaded engagement with the adapter as at 108, the closure cap also having abutting engagement with an auxiliary booster charge 109 disposed within the container 98, the auxiliary booster having abutting engagement with the booster charge 99. By this arrangement an explosive train is provided from the lead-in charge 78 disposed within the disc 27 to the main explosive charge 97.

It will be obvious that when the rocket is placed in a launching rack to be fired therefrom toward a target, the arming wire 13 is attached to the fuze in the same manner as heretofore shown and described and rotation of the propeller 14 is prevented thereby. When the rocket is fired from the launching rack the forward motion thereof withdraws the arming wire from the apertures 84 and 87 respectively arranged in the arms 88 and guide 85. Thus the fuze will be armed during the free flight of the rocket toward the target and upon impact therewith the fuze

7

will function as heretofore described thereby to explode the rocket. The operation of the fuze will be best understood by consideration of a specific example.

Briefly stated in summary, the present invention contemplates the provision of a new and improved fuze in which means are employed for preventing premature firing thereof due to sudden shock received thereby before the propeller has made a predetermined number of revolutions and in which means are also provided for maintaining the fuze in an initial safe condition until the bomb is dropped from an aircraft in flight and in which arming thereof does not occur except during the free flight of the bomb toward the target.

While the invention has been described with reference to a preferred example thereof which gives satisfactory results, it will be obvious to those skilled in the art to which the invention pertains, after understanding the invention, that various changes and modifications may be made without departing from the spirit and scope of the invention, and it is intended, therefore, in the appended claims to cover all such changes and modifications.

The invention herein described and claimed may be manufactured and used by or for the Government of the United States of America for governmental purposes without payment of any royalties thereon or therefor.

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

1. A mechanical impact fuze of the class described comprising a casing, an explosive charge arranged within said casing, a rotatable shutter releasably supported within the casing in an initial safe position and having a detonator adapted to be brought into alignment with a firing pin as the shutter is rotated to an armed position, means for rotating said shutter from said initial safe position to the armed position as the shutter is released, a firing pin having an impact device attached thereto, means including a threaded sleeve having a slot formed in one end thereof for rotatably supporting the firing pin for axial movement therewith in a direction outwardly of the casing and in initial releasable locking engagement with said shutter, said firing pin being adapted to release the shutter when the firing pin has been moved rotatably and axially a predetermined amount, means for rotating said sleeve, means on said firing pin disposed within said slot for preventing axial movement thereof in a direction outwardly until said sleeve is rotated, means on said firing pin in engagement with said rotating means for preventing axial movement of the firing pin in a direction inwardly until said sleeve is moved outwardly a predetermined amount, and means for releasably securing the firing pin to said sleeve, said last named means being adapted to release said firing pin for sliding movement inwardly within said sleeve and with respect thereto in response to a sudden impact received by said impact device thereby to fire said detonator and explode the explosive charge.

2. A mechanical impact fuze of the class described comprising a casing, a rotatable shutter releasably supported within the casing in an initial safe position and having a detonator adapted to be brought into alignment with a firing pin as the shutter is rotated to an armed position, means for rotating said shutter from said initial safe position to the armed position when the shutter is released, a firing pin for firing the detonator in response to a sudden impact received thereby when the shutter is in said armed position, means including a threaded sleeve for rotatably supporting the firing pin for axial movement therewith in a direction outwardly of the casing and in initial releasable locking engagement with said shutter, said firing pin being adapted to release the shutter when the firing pin has been moved rotatably and axially outwardly of the casing a predetermined amount, means including a hub for rotating said sleeve, shearable means for securing the firing pin to said sleeve and adapted to be severed to release said firing pin upon said impact, non-shearable means secured to said firing pin and disposed

8

within a recess arranged within the inner end surface of the sleeve for relieving the torsional stress on said shearable means as the sleeve rotates and preventing axial movement of the firing pin in an outward direction when said fuze is in an initial safe position, and an impact member normally in engagement with said hub for preventing axial movement of said firing pin in an inward direction when said fuze is in said initial position.

3. A mechanical impact fuze of the class described comprising a casing, an explosive charge arranged within said casing, a rotatable shutter releasably arranged within the casing in an initial safe position and having a detonator adapted to be brought into alignment with a firing pin as the shutter is rotated to an armed position, means for rotating said shutter from said initial safe position to said armed position as the shutter is released, a firing pin, means including a threaded sleeve for rotatably supporting the firing pin for axial movement therewith in a direction outwardly of the casing and in initial releasable locking engagement with said shutter, said firing pin being adapted to release the shutter when the firing pin has been moved rotatably and axially outwardly a predetermined amount by said sleeve, means including a hub connected to said sleeve for rotating the sleeve, shearable means for releasably securing the firing pin to said sleeve, said last named means being adapted to be severed and release said firing pin for sliding movement inwardly within the sleeve and with respect thereto in response to a sudden impact received by said impact member thereby to fire said detonator, non-shearable means providing axial movement of the firing pin inwardly of the sleeve as the shearable means is severed and a rotational driving connection therewith for relieving the torsional stress on said securing means as the sleeve rotates during outward movement of the sleeve and pin, said non-shearable means being adapted to prevent outward movement of said firing pin until said sleeve is rotated, an impact member normally in engagement with said hub for preventing axial movement of said firing pin in an inward direction until said sleeve is moved rotatably and axially outwardly, and means fired by said detonator for exploding said explosive charge.

4. A mechanical impact rocket fuze of the class described comprising a casing, a rotatable shutter releasably arranged within said casing in an initial safe position, a detonator disposed within said shutter and adapted to be brought into alignment with a firing pin as the shutter is rotated to an armed position, means including a spring for rotating said shutter from said initial safe position to said armed position as the shutter is released, an arming hub rotatably supported within said casing, an arming sleeve rotatably arranged within said arming hub and adapted to be moved axially in an outward direction with respect to said hub when rotated, threaded means on said arming hub, complementary threaded means on said arming sleeve in engagement with said threaded means on the hub for moving the arming sleeve axially outwardly to said armed position as the hub rotates, means including a propeller operatively connected to said arming hub for rotating the arming hub, a firing pin releasably secured within the sleeve for rotation and axial movement therewith and adapted to releasably lock the shutter in said safe position until the arming sleeve has been moved axially outwardly a predetermined amount, shearable means for releasably securing the firing pin to the sleeve and adapted to be severed and release the firing pin for sliding movement inwardly within said sleeve and with respect thereto in response to a sudden impact received by said firing pin, non-shearable means providing axial movement of the firing pin inwardly as said shearable means is severed and a rotational driving connection therewith for relieving the torsional stress on said securing means as the sleeve is rotated said non-shearable means being adapted to prevent outward movement of said firing pin until said sleeve is rotated, and an impact

member normally in engagement with said hub for preventing axial movement of said firing pin in an inward direction until said sleeve is moved rotatably and axially outwardly.

References Cited in the file of this patent

UNITED STATES PATENTS

2,131,037 Brayton ----- Sept. 27, 1938

2,190,374
2,397,781
2,405,023

5

127,924
257,335

Bold ----- Feb. 13, 1940
Fischer ----- Apr. 2, 1946
Errig et al. ----- July 30, 1946

FOREIGN PATENTS

Great Britain ----- June 19, 1919
Great Britain ----- Aug. 27, 1926