ABSTRACT: A disposable, explosive spear head with a frangible nose section weakened in a predetermined manner and including a gas expansion chamber to burst the nose portion with an explodable cartridge arranged in the chamber and in a fixed position relative to the main spear casing and in the path of travel of a firing pin captivated in the spear and adapted to be driven into the firing pin against a spring-biasing means to ignite the cartridge and burst the nose portion.
SPEAR HAVING FRANGIBLE NOSE WITH EXPLOSIVE DEVICE TO BE DETONATED ON IMPACT

It is an object of this invention to provide an improved, inexpensive spear for defense or attack purposes by human beings in underwater environments.

As is well known, humans are greatly handicapped in their movements under water by reason of the pressure at the various levels and the time expended while submerged, which is governed by rules for restricting a person's movement for his own safety. For instance, a deepwater swimmer must remain in the water until decompression steps are complete; during this time the swimmer is placed in physical danger from marine predators, such as sharks in particular. The present invention provides an inexpensive spear for use in a spear gun for protection against sharks. The spear gun is adapted to explode upon bodily contact with an object and is of a lightweight, inexpensive, disposable construction. It is, accordingly, an object of the invention to provide an improved, inexpensive spear.

It is another object of this invention to provide an inexpensive spear of the type described hereinafter which includes a frangible nose portion having fragmentation grooves to achieve a predetermined configuration after impact and bursting in use in the manner described.

It is another object of this invention to provide an improved, inexpensive, underwater spear which is adapted to explode on impact into a predetermined path of fragmentation of a nose portion to provide hooklike members of a banana-peel configuration to be secured to an object in a barblike fashion.

It is a general object of this invention to provide an improved spear gun characterized by a nose adapted to be burst upon impact and which includes a barrel to be exploded, which barrel is secured in a fixed position in the spear in fluid communication with the hollow of the frangible nose portion and in the path of movement of a firing pin biased in a retracted position and adapted to travel into striking engagement with the cartridge on impact.

In accordance with these and other objects which will become apparent hereinafter, the instant invention will now be described with reference to the accompanying drawings in which:

FIG. 1 is a side view of the spear;
FIG. 2 is an enlarged side elevation view which has been partly broken away and illustrating the leading or nose portion of the spear;
FIG. 3 is a view in cross section taken along the plane indicated by the line 3–3 of FIG. 2 and looking in the direction of the arrows; and
FIG. 4 is a partial view of the leading portion of the spear after detonation, bursting and impact upon striking an object.

Referring to the drawings, wherein like reference characters designate like or corresponding parts throughout the several views, there is shown in FIG. 1 an elongate spear body 12 of substantially uniform cross section which includes a tapered leading nose portion 14, the interior of which is hollow and in FIG. 2. The nose portion is preferably threadable connected to a trailing section 18 as by the threadress 20 sized to receive the companionately threaded trailing end 22 of reduced diameter of the nose portion 14. To the leading end 24 of the trailing section, an intermediate portion 26 comprising a firing pin housing is provided which interconnects the main trailing portion 28 of the trailing section with the nose 14. The intermediate portion is suitably connected to the trailing portion 28 as by the threads 30 and includes a seat 32 defined by the forwardly facing end of the trailing portion 28 of reduced diameter which extends into the firing pin housing and against which a firing pin member 34 dwells. The firing pin member 34 is captured within the intermediate portion 26 in the housing chamber 36 and urged into a retracted position in abutting relation of the seat 32 by biasing means 40 comprising a spring which is circumposed about the firing pin 42. One end of the spring urges the body 44 of the firing pin member 34 on to the seat 32 as the other end 48 bear against the septum 50 defined by a crimped portion of the housing wall, as shown in the drawings, which septum forms a partial floor of the aforesaid recess 20. Extending within the hollow 16 of the nose 14, a cartridge 52 is provided which includes the elongate cartridge portion 54 and the flange or base portion 56 which is sized to be received in sandwich-like relation between the floor 50 of the recess 20 and the trailing end 58 of the nose which includes an opening 60 sized for snug passage of the uniform cross-sectional area of the elongate cartridge portion 54.

In operation, when the spear is shot through the water, as from a gun, and the nose end 61 impacts upon an object, the kinetic energy of the firing pin member 34 will cause the firing pin member to move forwardly. Guide means comprising the outer surface of the body portion 44 of the firing pin member in sliding relation with the walls of the slide chamber 36 constrain movement to axial forward movement only toward the nose until the tip 64 of the firing pin 42 impacts upon it and explodes the cartridge. With the explosion there is a release causing gases to fill the hollow 16 and burst the nose portion in a preferred, predetermined pattern. To secure the desired fragmentation pattern, weakened areas caused by a pattern in relief are provided in the nose portion. In the preferred embodiment, the pattern includes longitudinally extending lines 66 and 68 which converge as at 70 and 72 around a weakened area 74. In this embodiment, the resulting expansion of the gases will burst the nose portion into the banana-peel configuration shown with the flaps portions 76, 78 and 80 assuming the indicated configuration shown in the drawings. The loading operation is facilitated by the retractor groove 82 which is provided on the spear body surface. The annular retractor groove 82 is preferably located about midlength of the shaft on the exterior of the spear for use in retracting the spear into the firing chamber of a spear gun. The shaft or body of the spear is preferably made of sheet steel or suitable plastic material. The firing pin housing or casing is preferably of a hollow sheet steel which is die-stamped into a tubular form and internally threaded at both ends to bound the leading and trailing spear portion receiving recesses shown in the drawings. The confronting ends of the nose portion and trailing portion are of a reduced diameter sized so as to be receivable in their recesses and not to interfere with the generally uniform cylindrical configuration of the spear over its main length. The fragmentation grooves are formed or cut into the cartridge casing or nose portion of the spear and, when exploded, the casing will, as a result, fragment along these grooves and spread radially resembling the skin of a peeled banana with the trailing section of the cartridge casing remaining intact. The assembly is adapted to be connected into spear form by simple, screw-threaded manipulation of the intermediate firing pin housing, the distance between the seat or end face 32 for the firing pin member 44 and the seat 50 that housing determining the movement of the firing pin on impact. The designed tensile strength of the spear cartridge is such as to cause it to rupture along the fragmentation grooves on the buildup of the gaseous pressure within the hollow 16 which follows impact.

It is thus seen that there has been provided an inertia-operated, explodable spear which includes a minimum number of parts, six items in the preferred embodiment. Three of these are of the type which are adapted to be constructed of die-stamped sheet steel and of a reduced cost of manufacture. The assembly of the spear is not complicated and the expense occasioned by this construction warrants the use of the spear as a disposable unit once its function is served, as evidenced by the drawings. The trailing portion 28 may be reversely threaded and separated from the spear after it has been used, and, in the preferred embodiment, the axial length of the firing pin housing from the seat 50 to the point where the portion 28 has been removed, the firing pin may be removed from the chamber 36. There are no fuses necessary in this device as the
3,599,569

3. The improved spear as set forth in claim 1 wherein said section includes a chamber in said section adjacent said nose and terminating at said seat, said seat being circumposed about the axial centerline of said spear and said guide means comprise the walls of said chamber and an enlarged portion on said firing pin in sliding relation with said chamber walls to constrain the firing pin to axial movement with the distal end of the firing pin at all times at about the axis of symmetry of said spear.

4. The improved spear as set forth in claim 1 wherein said trailing section includes a leading firing pin housing and said guide means includes a limit means at the trailing end of the firing pin housing normally engaging the firing pin when in the retracted position to limit axial movement of the firing pin to forward movement only toward the nose portion and against the bias of the biasing means on impact.

5. The improved spear as set forth in claim 4 wherein said biasing means comprises a coiled spring interconnected said firing pin and said section and intermediate said cartridge and said firing pin.

6. The spear as set forth in claim 1 wherein said nose portion includes a plurality of longitudinally extending weakened fragmentation grooves to effect the predetermined fragmentation pattern on bursting of the nose portion.

7. The spear as set forth in claim 2 wherein said partial floor across said chamber comprises an annular crimp in said firing pin housing.

8. The spear as set forth in claim 1 wherein said firing pin housing comprises a member in threaded engagement with said trailing section, said member including a threaded recess at each end thereof and said nose portion and said trailing section interconnects with said member by threaded means comprising exterior threads on the surface thereof to be received in threaded engagement in said recesses and said seat comprises a crimped portion defining a partial floor for the recess receiving said nose portion, the axial length of said nose portion receiving recess being less than the threaded axial length on said nose portion with the difference in length comprising and defining an annular seat between the partial floor and the trailing end of the nose portion, and said cartridge includes an enlarged flanged portion to be captivated in said seat.

9. The spear as set forth in claim 1 wherein said elongate spear body includes an annular retract groove in the exterior surface thereof.